FLYING

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Exclusive:
The Navy's Top Air Admiral Re-states Naval Aviation's Goals

AIR SUPREMACY

★

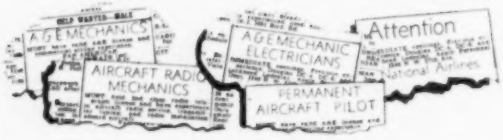
The Pole Vaulter

NOW IS THE TIME

TO TAKE THE STEPS THAT WILL GIVE *You* LIFE-TIME SECURITY IN AVIATION!

Embry-Riddle

RIGHT NOW...TODAY...OPPORTUNITIES FOR TRAINED AVIATION SPECIALISTS ARE "GOING BEGGING"! ONE YEAR FROM TODAY, THE DEMAND FOR CAREER MEN IN THE AVIATION INDUSTRY WILL BE EVEN GREATER!



We can offer you *definite proof* of the above statement... or, to prove it to yourself, watch the "Help Wanted" columns of any of the big city newspapers. Aside from the fact that there *are* many many jobs open in aviation today, the future requirements of this tremendous, rapidly-growing industry will assuredly grow far in excess of the number of men available and qualified to fill the jobs.

THIS IS YOUR OPPORTUNITY...AND NOW IS THE TIME TO PREPARE FOR IT!

Embry-Riddle training is by far your quickest, surest road to the opportunities in the aviation industry. Complete eight-month to two-year Embry-Riddle courses in every phase of aeronautics are tailored to the practical and exacting aviation industry requirements.

YOUR EMBRY-RIDDLE GRADUATION CERTIFICATE INSURES YOUR CAREER OPPORTUNITY!

You learn fast and well at Embry-Riddle. You work with live aircraft in vast shops and hangars...with the finest instructors...with the finest equipment available anywhere. If military service interrupts your studies...you're still a long way ahead of the crowd.

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THESE COMPLETE EIGHT-MONTH TO TWO-YEAR EMBRY-RIDDLE COURSES ARE TAILORED TO THE PRESSING DEMANDS OF THE AVIATION INDUSTRY!

AIRCRAFT & ENGINE MECHANICS

Vast numbers of *properly* trained A & E Mechanics are urgently needed. Our C.A.A. approved school with a quarter-century experience assures your quickest advancement. Embry-Riddle students learn fast with modern equipment, including jet...live aircraft, airline-size hangars.

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Embry-Riddle trained pilots benefit from our years of experience with 30,000 students...the best instructors, up-to-date aircraft, superb year-'round flying weather. Also Instrument and Instructor's ratings.

A & E COMBINED WITH COMMERCIAL PILOT

Airmen with *dual* pilot-engineering ability are needed by aviation companies and operators. Embry-Riddle *combination* training offers you the most in your aviation career.

ELIGIBLE VETS STILL ACCEPTED UNDER G.I. BILL OF RIGHTS

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- ☐ Commercial Pilot
- ☐ Aeronautical Design and Technology
- ☐ A.&E. Combined with Commercial Pilot
- ☐ A & E Combined with Private Pilot

Check One ☐ Veteran ☐ Non-Veteran

TRAIN IN MIAMI — AIR CAPITAL OF THE WORLD

solid cross-country performance

plus economy!

That's Why, in 1951, More People Have Bought Piper Pacers and Tri-Pacers Than Any Other Type of Plane

Faster, more flexible, more convenient transportation—that's the advantage of a company-owned or personal airplane. "Less expensive, too" is an added *plus* with the sensational Piper Pacer or Tri-Pacer.

The latest four-passenger Pipers, with the heritage of Piper's 20 years of plane-building experience, provide solid cross-country performance—better than 120 mph cruising speed (134 mph for Pacer Model "135"), ample fuel for long range, and quiet, comfortable cabins—at much less cost than any other personal airplane.

They make plane ownership practical for the first time for many businesses and individuals. And the Tri-Pacer, with simplified controls and tricycle landing gear, makes flying so easy that people have soloed after only one day of instruction.

Fly the Pacer or Tri-Pacer—compare price, performance and low operating cost—you'll buy Piper, too.

PIPER AIRCRAFT CORPORATION

LOCK HAVEN, PENNSYLVANIA

MUCH NEW FOR '52. Many fine new features for added performance and comfort are incorporated in the Pacer and Tri-Pacer for 1952. See your Piper dealer or write for Pacer brochure to Dept. G-12.

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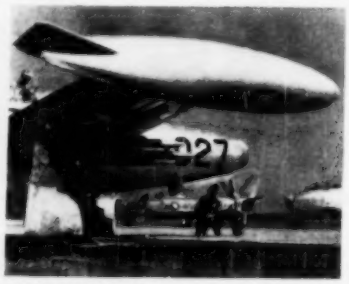

THE COVER: The Air Force's rocket-equipped Republic Thunderjet fighter.

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Slick airways'

NEW ALL-FREIGHT DC-6A's FUEL WITH

PHILLIPS 66!

New Phillips 66 platform-type tank trucks rapidly refuel Slick super-freighters. Two enormous cargo doors permit simultaneous loading and unloading of Slick's new DC-6A's.

SLICK AIRWAYS, large scheduled carrier of commercial airfreight, has recently added a fleet of six new Douglas DC-6A super-freight planes. These planes maintain regular, 9-hour, coast-to-coast flights . . . faster than many passenger plane schedules . . . at regular airfreight rates!

When speed and dependability are essential, manufacturers ship via Slick Airways. And because performance and dependability are imperative in the air, Slick fuels with Phillips *66* Aviation gasoline. More and more large commercial airlines and private plane owners are using Phillips *66* high-octane fuels and Phillips *66* airplane lubricants. For dependable aviation products, think first of Phillips. The Aviation Department, Phillips Petroleum Company, Bartlesville, Oklahoma.

Luxury-loving orchids arrive in the pink of condition after fast, comfortable coast-to-coast trip via Slick Airways. Pressurized cabin and controlled temperature preserve freshness.

Phillips 66

AVIATION PRODUCTS

NOTES ON CIVIL FLYING

Air Show Waivers

CAA Administrator Charles F. Horne has announced a new policy under which certificates of waiver of the air traffic rules will be issued for air races, air meets and similar aeronautical demonstrations "only when it is shown that such activities will contribute directly to the advancement of, and public confidence in aviation."

The new CAA policy does not rule out air shows entirely, but does ban certificates of waiver for those which include acrobatics not under direct radio control provided by the certificate holder, delayed parachute jumping, dog fighting, "crazy" flying, intentional aircraft crashes and similar unusual and hazardous types of aircraft operation.

Mr. Horne said that while his new policy follows the recent serious accident at an air show in Flagler, Col., it is based on a study of the whole air show question, in light of current aviation progress, rather than the circumstances of that accident. Information from Flagler indicated that the pilot who crashed into the crowd did so while performing unscheduled stunts on his way in from Denver, not the act he was due to give later under terms of the waiver.

"I do not feel it is good public policy today to authorize departures from the carefully framed Civil Air Regulations solely for the sake of thrills," Mr. Horne stated. "Where some constructive purpose is served, CAA will continue to issue waivers, but otherwise the CAB's standing regulations will be enforced by CAA without exception."

Noise Reduction

An exhaust muffler for DC-3 airplanes which reduces noise on take-off by some 60 per cent has been perfected by the Aero Sonic Corporation and received preliminary CAA approval.

The muffler's basic design consists of a tube mounted within a tube with a Venturi-shaped tail pipe to induce a jet

action in scavenging gases from the muffling chamber. The danger of backfire has been eliminated by the incorporation of a vent which draws in fresh air by means of a small funnel-shaped scoop forward of the muffler.

With only minor modification needed to add the air scoop, the new mufflers are easily added to the existing DC-3 and C-47 tail pipes.

Super Transport

Already being ordered in quantities by the airlines and armed forces, the new Lockheed *Super Constellation* is 18.4 feet longer than its predecessor. First models are powered by four Wright 2,700 h.p. engines with jet stacks added for extra speed. It is built with reserve strength for the later installation of compound and jetprop engines, the latter capable of 400 m.p.h. speeds.

Maximum visibility has been effected by the installation of rectangular panorama windows. Relocation of windows in relation to seats makes for relaxed viewing comfort and increased natural light. Greater protection against frost and fog has been obtained by the circulation of more warm air between the new windows double-panes.

The fuselage has been extended so that its 113 feet 7 inches makes it the longest of any major transport.

Flight Aids

Used in conjunction with autopilot, the Lear Automatic Altitude Control maintains an airplane at a constant barometric pressure altitude. In an effective operating range of 1,000 feet to 20,000 feet above sea level, the Control maintains an accuracy of 50 feet.

The primary components of the Automatic Altitude Control are a pressure sensitive bellows; an electro-magnetic disconnect clutch and an electrical EI pick-off transformer. The entire mechanism is enclosed in a case which is air-tight except for the connection to the static pressure line of the airplane.

The Learmatic Navigator eliminates many of the unnecessary and irksome mental operations which are interposed between a navigational problem and its actual solution while in flight. It combines a magnetic compass, a radio compass pointer and course selector grid lines. The Navigator simultaneously presents a graphic picture of the magnetic heading of your plane; the course you want to remember; and the direction of the radio station that is tuned in on your radio compass.

Airways Operations Specialists

In order to streamline operations and conserve manpower, the CAA has combined traffic control tower and communications operations in non-congested areas. Communicators and air traffic controllers are to be trained so that they know both operations.

Formerly classified separately, the two groups are now combined as Airways Operations Specialists but employment entrance requirements are the same. No such changes are planned in heavy-traffic areas.

CAB Pamphlet

Mountain Winds and Their Effects on Flight by George M. French has been issued by the Bureau of Safety Investigation of the Civil Aeronautics Board. The paper deals primarily with the direct effect on airplanes of strong winds over mountain peaks or ridges. Wind flow patterns and pressure variations are described. Aircraft accidents caused by wind changes over mountainous areas are reported and analyzed. Classified as Safety Bulletin 186-51, it can be obtained from the CAB in Washington, D. C.

Boxcar in Airlift

A C-119 is on loan from the USAF to a civilian iron mine development company which is building a railroad from Seven Islands to rich iron ore-fields in the remote area of Knob Lake Labrador. In the first operation of its kind, the C-119 is supplying the necessary airlift for heavy to penetrate the remote area.

The C-119 *Boxcar* is the only means of hauling in the heavy construction equipment and machinery needed to develop the area which is accessible only by air. Tractors, trucks, generators, as well as 25-foot lengths of culvert pipe (see photo), are the type of equipment being hauled by the medium transport.

You read about "BRANDENFELS' WONDERFUL WIDGEON" in the October issue of FLYING. Probably you have seen the stories and ads about Carl Brandenfels in Argosy, Coronet, Esquire, Liberty, Look, Sir, V.F.W. and many other national publications.

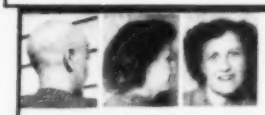
BRANDENFELS USERS Have Grown Hair!

Carl Brandenfels stands beside his 2-motor Grumman Widgeon, "The Hair Liner." Carl pilots his own plane, and he has flown over 1,500 hours in the past two years.

"I have just completed an 8,500 mile flight to continue my research on the causes of baldness and to visit a few of the many thousands of satisfied users of my own home course. These heartwarming stories are of vital interest to every man or woman who is bald, losing his hair or worried about baldness."

INDIANA MINISTER PRAISES BRANDENFELS

"Since using Brandenfels, the greasy scum on my scalp and the thick dandruff scales have gone and have not returned. New hair growth has started and my hair has taken on amazing new life." —Reverend Earl S. Newkirk, 2505 N. 15th, Terre Haute, Indiana.



IDAHO HOUSEWIFE HAS HAIR AGAIN

"I was totally bald. Now I have my hair back again. Your formulas and massage are wonderful."—Mrs. Frank Still, Box 130, Craigmont, Idaho.

NEW YORK CITY ARMY VETERAN

"I contracted malaria while serving in the South Pacific and lost most of the hair on top of my head. I tried everything under the sun, but nothing worked until I used Brandenfels."—Sgt. Matthew Jonas, 112 E. 7th St., New York City.

DETROIT, MICHIGAN NAVY VETERAN

"I see much improvement. My hair was thinning out very fast. Now in areas where I had only a little hair, it is getting thicker and increasing in quantity." —Joseph Josefiak, 5663 Homedale, Detroit, Michigan.

NO MORE WIG FOR OHIO GIRL

"My hair fell so badly I had to wear a partial wig, but since using Brandenfels my hair has come along just wonderfully, and I do not wear the wig any more."—Millie Arbutina, 1132½ S. Market, Canton, Ohio.

DENVER EXECUTIVE REPORTS PROGRESS

"I had a bald area 4 inches wide across the top of my head. Now this is only 2½ inches wide, and even that is covered with fine blond hair."—Walter A. Alkire, 1300 Kingston St., Aurora Colorado.

SPORTING GOODS DEALER PLEASED WITH RESULTS

"My hair line was receding, my scalp itched and my hair was dry. Now I have no more excessive falling hair, my scalp conditions have improved, and I can see new hair growth."—Fenton Bash, 21 W. 5th Ave., Gary, Ind.

17,514 LETTERS OF PRAISE FROM 3,452 CITIES AND TOWNS

The men and women shown on this page are only a few of the thousands of satisfied users of my BRANDENFELS' SCALP AND HAIR APPLICATIONS AND MASSAGE. By certified count, documented by the impartial audit of certified public accountants, I have received 17,514 letters from users who report from one to all of the following results:

DO A FRIEND A FAVOR
If you don't have this problem, send this message to a friend needing it

- RENEWED HAIR GROWTH
- NO MORE EXCESSIVE FALLING HAIR
- RELIEF FROM DANDRUFF SCALE
- IMPROVED SCALP CONDITIONS

These letters come from every state and from 3,452 different cities and towns. Some are from men and women who were totally bald; others are from people who have just begun to notice excessive hair loss. Some are elderly users, others from "middle-aged" men and women, and still others from young business people anxious to preserve their youthful appearance. And, of course, I have no way to measure the additional thousands of my users who may also have obtained results but have not written to tell me of their success.

NEW MESSAGE OF HOPE

Your hair roots CAN BE ALIVE even though no hair is growing! Read this again. HAIR ROOTS CAN BE ALIVE on bald or partially bald men and women. My research has proved this amazing fact. Medical tests have verified my findings with actual photo-micrographs of scalp tissue. Most important of all, thousands of every day users of my home course have proved it—on their own heads!

Do not delay any longer! Send today for this amazing home course which has brought so much happiness to so many people. Use Brandenfels' Scalp and Hair Applications and Massage . . . AND FIND OUT FOR YOURSELF!

THE ONLY FORMULAS AND MASSAGE OF THEIR KIND IN THE WORLD

These two secret formulas, together with my unique Brandenfels' pressure massage, are designed to bring about a more healthy condition of the scalp, to soften the scalp, and to increase the supply of blood to the entire scalp area. I believe that, in many cases, proper use of my formulas and massage may bring about a condition which will help nature ALLOW HAIR TO GROW.

I do not class my product with the so-called "hair-growers." I cannot guarantee that it will promote new hair growth, because not every user has grown new hair. I HAVE PROVED that in many bald or partially bald men and women, hair roots are still alive even though no hair is growing from them. I HAVE PROVED that users of my home course HAVE GROWN HAIR. I do point with pride to the thousands of testimonials I have received from SATISFIED USERS all over the country. And on the basis of this DOCUMENTED EVIDENCE, I do sincerely recommend my Brandenfels' Scalp and Hair Applications and Massage to you.

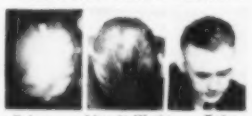
ACT BEFORE IT'S TOO LATE

If you are now losing your hair or have already become bald, SEND TODAY for Brandenfels. PLEASANT TO USE AT HOME. No embarrassment, no time lost from work, no costly office treatments. Formulas are non-sticky, non-odorous, and will not rub off on hat bands or bed linens. A five-week supply costs $15.00 plus $3.00 Fed. tax (total $18.00). Send your order TODAY to Carl Brandenfels, Box 766-D St. Helens, Oregon.

ROUTE OF MY TRIP

Above is the route of my trip and pictures of just a few of my users whose results I inspected with my own eyes. For the complete story of my trip, pictures of successful users in Detroit, and factual information about my amazing home course, send a post card or letter to me Carl Brandenfels, Box 766-D St. Helens, Oregon.

DOCTORS VERIFY RESULTS



Before After 4½ Weeks Today

For more than a year a large group of men and women have been using Brandenfels' Scalp and Hair Applications and Massage under medical observation. Above is one of these users, Mr. E. "Al" Liefson, 7019 S. Tacoma Way, Tacoma, Wn. The authenticity of these medical tests and the results observed in them is documented by the sworn testimony of the medical personnel who conducted and participated in these tests.

BOTHERED BY DANDRUFF? ITCHING SCALP?

More and more, doctors agree that unchecked dandruff scale and itching scalp conditions can be FIRST WARNING signals of PREMATURE BALDNESS. If you have these conditions and do not act promptly, YOU MAY LOSE YOUR HAIR! So if you are troubled by dandruff scale or itching scalp, SEND TODAY for Brandenfels' Scalp and Hair Applications and Massage.

FILL IN THIS ORDER FORM TODAY

CARL BRANDENFELS, Box 766-D St. Helens, Oregon PA13251

Please send me—in a plain wrapper—a 5-week supply of **Brandenfels' Scalp and Hair Applications and Massage** with directions for use in my own home.

☐ Cash — I enclose $15.00 plus 20% Fed. tax ($3.00), total $18.00. (Will be shipped prepaid.)

☐ C. O. D. — I agree to pay postman $18.00 plus postal charges.

Name .....

Address .....

Town ..... Zone ..... State .....

Cash orders will be shipped immediately prepaid. C. O. D. orders will be filled as rapidly as the formalities become available.

PLEASE PRINT PLAINLY

MILITARY NEWS

F-89 RADAR AND EJECTION

. . . **First details** of the mysterious "X-ray eyes" that enable the USAF *Scorpion* F-89 to stalk enemy aircraft through darkness and storms have been disclosed.

Radar equipment, providing a sixth sense for the pilot and his observer, is concealed behind an opaque plastic shield in the extreme forward portion of the twin-jet's nose. Radar waves are emitted from within the nose by a dish-shaped antenna. These waves travel in the form of pulses at the speed of light (186,000 miles a second).

Whenever the pulses strike a solid object, such as an airplane in flight, they bounce back toward the *Scorpion*. An airplane in flight appears on the indicator as a "blip" imposed upon a grid. Position of the "blip" on the grid identifies the airplane's location. The radar operator operates controls that "lock" the radar transmitter-receiver on the target airplane. The indicator device gives the pilot a computed target course to fly.

. . . **During high speed**, high altitude flights of the *Scorpion* without a cockpit canopy, it has been discovered that crew members can effectively operate their seat ejection systems to escape in an emergency at speeds in excess of 500 m.p.h. Although minus a canopy, the plane's handling characteristics were not markedly affected and the pilot was not subjected to appreciable discomfort.

MANUFACTURING RIGHTS

. . . **Continental Motors** has acquired exclusive US manufacturing rights from Societe Turbomeca of Bordes, France, to a family of nine gas turbines developed under sponsorship of the French Air Ministry. The engines span a horsepower range from 200 to 1,100.

Military applications, such as guided missiles, helicopters, target planes and air compressors constitute the biggest potential market for immediate use.

The engines have a high degree of interchangeability of basic parts betwen various models which simplifies manufacture and maintenance.

. . . **Lockheed Aircraft has signed a contract** with the Canadian government authorizing Canadian manufacture of the T-33 jet trainer airplanes. Canadair Ltd. of Montreal has been appointed as the government's agent to build the planes.

PLANE MODIFICATIONS

. . . **An armed version of the Temco T-35** *Buckaroo* Military Trainer is equipped with two 30-caliber machine guns, gun-sight, gun camera and 10 2.75 inch rockets. The Texas Engineering and Manufacturing Company is staging demonstrations for the armed forces. It differs from other trainer installations in that the guns are submerged completely within the wing. They are mounted on the torsional axis of the

wing in a manner similar to the gun mountings in fighter aircraft. The rocket installation is also of the big airplane type, with five rockets mounted on rails under each wing and the fire control is by an intervalometer system.

. . . **Fairchild has begun construction** of a revised model *Flying Boxcar* to be known as the C-119H and it is expected to make its first flight early in 1952. The most apparent change of the carrier will be an increased wing area enabling a lower minimum flying speed. It will also be able to take-off and land in shorter distances and carry greater military loads. A newly-designed rough-field landing gear will be incorporated.

. . . **The Air Force has put** the first modified T-29 navigator-bombardier trainer into service. Convair has equipped the twin-engined trainer with new outer-wing panel tanks which increase the fuel capacity to 1,500 gallons. Structural changes have increased the gross weight from 40,500 pounds to 43,575 pounds. New radar equipment has been installed to provide students with the latest electronic devices for navigator-bombardier training.

BRITISH DOUBLE JET POWER

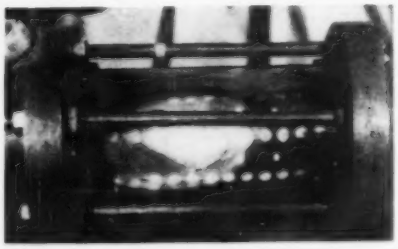
. . . **A revolutionary rocket motor**, designed to double the power of jet fighter aircraft and to switch on and off at the will of the pilot, was announced by Armstrong Siddeley.

Dubbed the *Snarler*, the engine doubles the jet fighter's power at very high altitudes, as well as in climbs and level speed flight. Unveiled at the Farnborough show, the *Snarler* has been extensively flown in the P 1072 *Hawker* experimental aircraft. First of its type, it fits into a space three by six feet and only weighs 215 pounds, yet develops a 2,000 pound thrust at sea level.

Unlike the gas turbine, the *Snarler* does not rely on atmospheric oxygen. It uses fuel made of liquid oxygen and a water-methanol mixture.

CARBON CONTENT CHECKER

. . . **A midget jet combustion chamber** to check carbon content of engine liners has been developed by the Wright Air Development Center. It eliminates running costly tests on regular jet engines.



The scale model of a jet airplane's combustion chamber will be extensively used to test fuels for their tendency to deposit carbon in the chamber liners. To a lesser extent, it will also be used to test for combustion efficiency, which indicates what percentage of a fuel is being burned. It will check on rich and lean "blow-out limits," to tell whether a fuel mixture is too rich or too lean to burn properly.

The little device consists of a burner liner measuring two inches in diameter. Forced into this metal container is a jet of air preheated to 400° F., which is the temperature of the air as it enters the jet combustion chambers, and the jet fuel mixture of kerosene and gasoline.

NAVY 'COPTER AWARD

. . . **The Navy has revealed** that a contract to build a jet-powered "cargo unloader" type helicopter has been awarded to the McDonnell Aircraft Corporation. Six manufacturers participated in the design competition, which called for a ship-based helicopter capable of transferring heavy equipment to other ships or to combat units ashore under all weather conditions.

McDonnell's winning design uses a single three-bladed rotor driven by small jet engines on the blade tips. The proposed helicopter will have powerful winch equipment and retractable cargo sling.

CROSS-WIND GEAR

. . . **Wright Air Development Center** has completed successful flight tests of the first large tricycle landing gear airplane to be equipped with cross-wind wheels. A C-54 was equipped with size 17.00-20 cross-wind wheels under specifications by the Aircraft Laboratory and built by the Goodyear Tire & Rubber Company.

Equipped with an hydraulic device to lock wheels in position of caster immediately after touch-down, the C-54 wheels are a development of the standard Goodyear cross-wind gear design.

Evaluation of the wheels on the plane is aimed at determining the performance characteristics of the wheels on larger airplanes and evaluating cross-wind gear as a safety aid to all-weather flight.

PLASTIC PLANE SKINS

. . . **The RAF began tests** with a plastic "Cocoon" process which is to be used for storing aircraft in the open for much longer periods than have been possible up to now. Planes can be wrapped up in air-tight weather-tight temperature-tight skin for an "indefinite" number of years.

The long-term technique is to spray plastic spider's web over any gaps and inlets such as engine nacelles to give a firm foundation for the "Cocoon." The Cocoon itself is then sprayed over the web. It molds itself to the shape of the plane and feels like a tough pliable leather skin.

DE-ICING SYSTEM

. . . **The USN's AD-***Skyraider* has a new and improved pneumatic de-icing system that is said to be more efficient than any previous ones in breaking heavy ice formations and is capable of withstanding the high speed of this attack bomber without coming loose from the wing surfaces.

Designed by the B. F. Goodrich Company in collaboration with the Navy's Bureau of Aeronautics and Douglas engineers, the new method involves a shorter cycle of pulsation that produces faster ice-breaking action. It is attached to the *Skyraider* by a super-adhesive that will prevent "lift away" at any speed.

MOBILE RADIO TEST BENCH

. . . **A mobile radio test bench** that can be flown with a transport squadron to set up operations at any location has been built by MATS airmen at Haneda Air Base, Tokyo. Actually built for the C-54's radio and radar equipment, the new unit can be used as a miniature radio maintenance shop and can be carried with the squadron to keep its radio equipment functioning properly.

Off to a Good Start!

Headed for interesting jobs under the Airman Career Program are Private Karl O. Engstrom, pictured at left above, from Willmar, Minn., and Private First Class Bob Jones, right, from Yakima, Washington. Recently enlisted, both men's aptitudes and interests showed that they would make good weather observers. Now they are getting the chance.

Sergeant Henry B. Wuenbold, Jr. from Cincinnati, Ohio, is instructing Karl and Bob on use of the Theodolite in tracking hydrogen balloons to determine wind speed and direction at various altitudes.

When Karl and Bob finish training, under instructors like Sgt. Wuenbold, they'll be grounded in the fundamentals of a vital, interesting job with the Air Force.

This same opportunity is waiting for you! The Air Force has technical schools in 44 career fields. You'll be taught an important job *and you'll be paid while you learn.* As you grow more expert you'll be advanced in rank and pay. Get off to a good start now. Visit your nearest U. S. Army and U. S. Air Force Recruiting Station.

U. S. AIR FORCE

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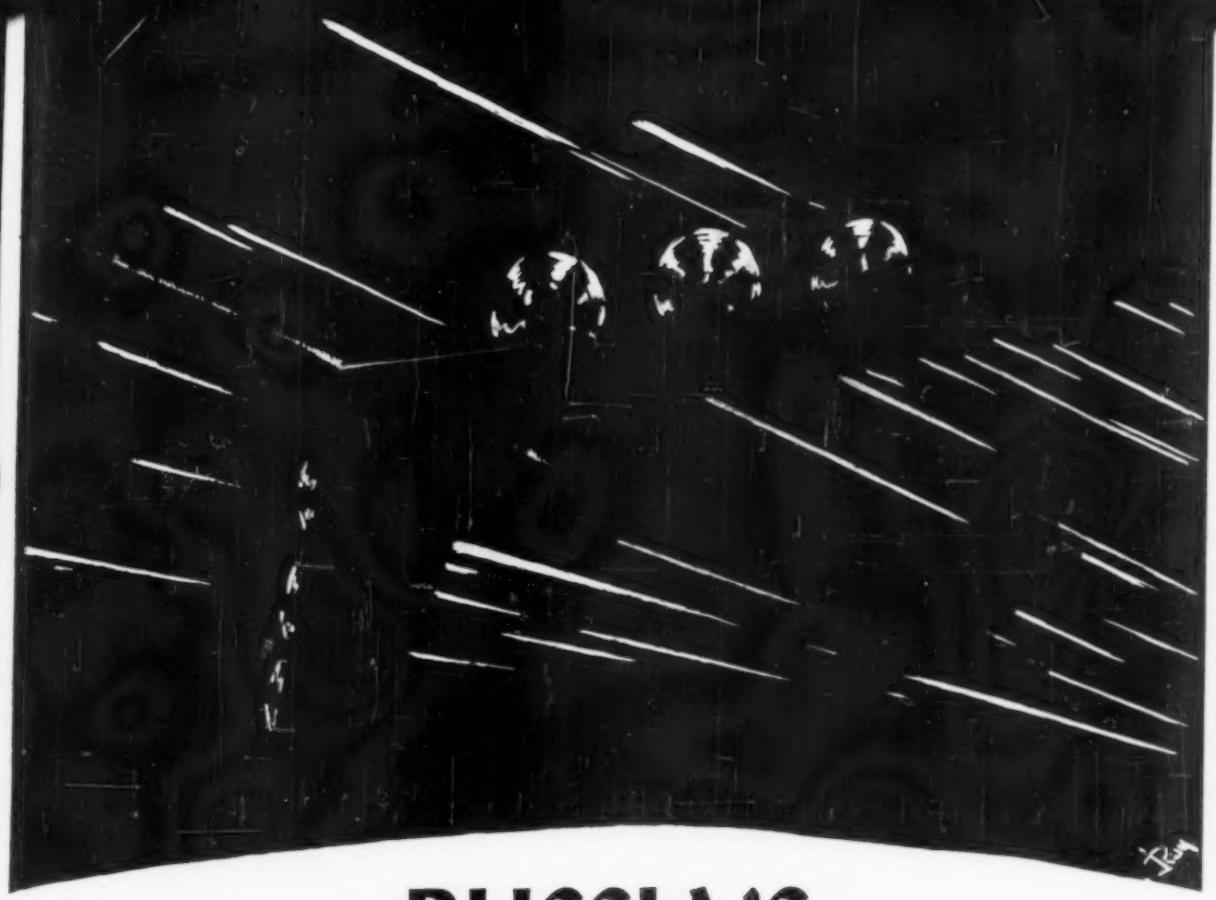


RUSSIA'S A-BOMBER

Stalin soon will have an A-bomber that can hit our major cities. Here's how it compares with our sweptwing B-60 and B-52 heavies.

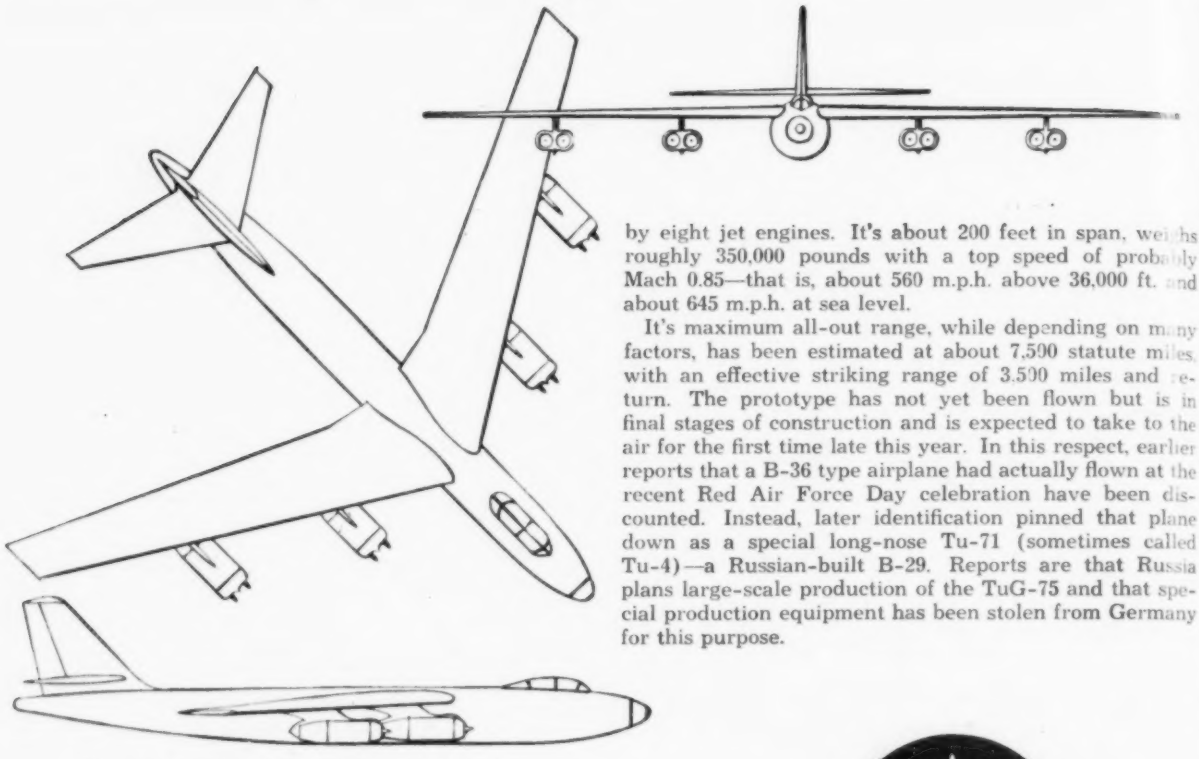
"ONE THING WE KNOW FOR SURE"

'One thing we know for sure: The Soviet Union has been working intensively on a heavy bomber to match the B-36. She will, unquestionably, build it—but the B-36 does not represent the limit of our invention. An intercontinental jet bomber is almost ready for test flights; an atomic-powered plane is more feasible than most people imagine. Soviet developments with big planes will call for radically different measures, but right now I am speaking in practical terms of the immediate situation and the probabilities of the next two or three years."—Gen. Hoyt S. Vandenberg, Chief of Staff of the Air Force, in Saturday Evening Post, Feb. 17, 1951.

RUSSIA HAS a turbo-jet sweptwing B-36—an ultra long-range, inter-continental atomic bomber capable of sliding over the top of the world in a sneak attack on American cities. It could take off from Northern Siberia, or from secret air bases hidden in the Arctic wastelands, to run the gauntlet of early-warning radar stations encircling Northern Canada in an attempt to slide through to Detroit, Chicago, or New York. By re-fueling in mid-air it could fly to any of our key industrial cities in an aerial Pearl Harbor. That's the latest word from those in the know as to what Russia has, what she is building and what she is designing.

Russia's B-36 is called the TuG-75 and was designed by the team of Tupolev and Gurevitch. It's a fast, high-altitude sweptwing monster with six turbo-jet engines buried along the wing leading-edge and is roughly the size of the B-36 and our own sweptwing eight-jet Boeing B-52.

In fact, it's very similar in size and shape to the sweptwing version of the YB-36 (the B-60) which is powered



Three-view drawings of Boeing XB-52, which is basically a blown-up version of the B-47 Stratojet. The B-52 has eight J-57 jet engines, a 200-ft. span.

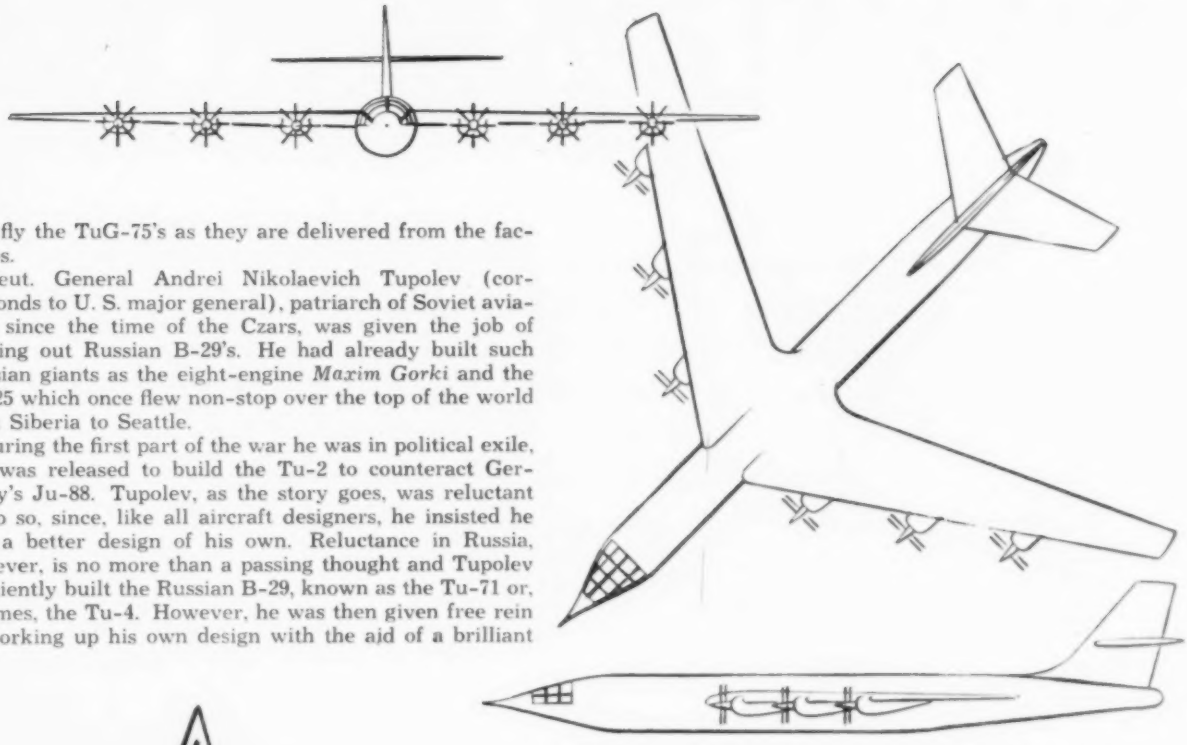
Artist's conception of Convair's YB-60, sweptwing version of the B-36 intercontinental bomber. Note the distinctive break in wing root, and position of engines.

by eight jet engines. It's about 200 feet in span, weighs roughly 350,000 pounds with a top speed of probably Mach 0.85—that is, about 560 m.p.h. above 36,000 ft. and about 645 m.p.h. at sea level.

It's maximum all-out range, while depending on many factors, has been estimated at about 7,500 statute miles, with an effective striking range of 3,500 miles and return. The prototype has not yet been flown but is in final stages of construction and is expected to take to the air for the first time late this year. In this respect, earlier reports that a B-36 type airplane had actually flown at the recent Red Air Force Day celebration have been discounted. Instead, later identification pinned that plane down as a special long-nose Tu-71 (sometimes called Tu-4)—a Russian-built B-29. Reports are that Russia plans large-scale production of the TuG-75 and that special production equipment has been stolen from Germany for this purpose.

Stories of the birth of the TuG-75 are interesting. Russia has always discounted strategic bombing and scoffed at American claims that it was breaking Germany's back during the long wait for a second front in World War II. However, two later events were to change their minds. First, several B-29's crash-landed in Siberia during the bombing of Japan and gave them free working models of the most advanced long-range bomber in the world. Secondly, they themselves saw—and remembered, the gutted burned-out hulks of what once had been busy towns and factories as their troops entered Eastern Germany. They knew *they* hadn't done it. It was an unforgettable lesson in cause and effect.

Consequently, after the war the Soviet High Command set up a strategic air command, Long Distance Flying Command (ADD) under Air Marshall A. Y. Golovanov, and equipped it with Russian built B-29's. This command



Russia's super-bomber, scheduled to fly late this year, is equipped with contra-rotating turboprops which provide greater range and better fuel economy.

will fly the TuG-75's as they are delivered from the factories.

Lieut. General Andrei Nikolaevich Tupolev (corresponds to U. S. major general), patriarch of Soviet aviation since the time of the Czars, was given the job of turning out Russian B-29's. He had already built such Russian giants as the eight-engine *Maxim Gorki* and the Tu-25 which once flew non-stop over the top of the world from Siberia to Seattle.

During the first part of the war he was in political exile, but was released to build the Tu-2 to counteract Germany's Ju-88. Tupolev, as the story goes, was reluctant to do so, since, like all aircraft designers, he insisted he had a better design of his own. Reluctance in Russia, however, is no more than a passing thought and Tupolev obediently built the Russian B-29, known as the Tu-71 or, at times, the Tu-4. However, he was then given free rein in working up his own design with the aid of a brilliant

mathematician and structural engineer—Mikhail I. Gurevitch (the Mr. "G" in the MIG-15). Tupolev's brain child was the TuG-75. Tupolev and Gurevitch then are the logical Russian design team to attempt anything as ambitious as a B-36 class airplane and we can only wait to see how successful they have been.

The TuG-75 looks like several other airplanes. The wing is a low mid-wing, in contrast to the Boeing B-47 which carries the wing high on the fuselage. The angle of wing sweep is about the same—about 35° since this is considered to be the best compromise between structural strength and aerodynamic benefits at high speed. The fuselage is long and cigar-shaped with a pointed conical-shaped nose. The cross-section is a circle to hold pressurization needed at high altitude. Perhaps the only American counterpart in this respect is the old Republic *Rainbow*—or the nose of the XS-1 supersonic plane. The cockpit windows are flush with the contours of the fuselage as in the B-29, and B-50. The tail surfaces are swept back about the same amount as the wings. The horizontal tail is half-way up the fin—much as in certain American and German practice in order to be above the wash from the wing and thus guarantee control as the plane approaches its critical Mach number.

All surfaces, wings and tail controls, are thin and of high speed "laminar" contour. In fact, the wings are so thin that the axial-flow engines (smaller in diameter than centrifugal-flow types) still protrude from the surface. The air intakes are in the wing leading-edge and the two eight-blade contra-rotating propellers are mounted on a short extension housing—undoubtedly carrying the reduction gears.

The entire plane is smooth on its exterior surface without protuberances or even gun blisters—a feature that indicates that the Russian theory on aerial defense for long range bombers is very similar to those recently adopted by ourselves and the British. Speed, high-altitude and deception are counted on to slip the super-bomber through to the target.

The engines are undoubtedly advanced German jet models captured by the Russians at the end of World War II. Two possibilities exist—and it is highly probable that the actual engines used are a development combination of the two.

The first is the turbo-prop version of the Junkers *Jumo*-012 which was designed with reduction gears for driving a propeller. The turbo-prop version was called the -002. This was an 11-stage compressor, axial-flow, two-stage turbine model with an annular combustion chamber developing a thrust of 6,000 pounds. Several actual working models of this engine were known to have been captured by the Russians. The other possibility is the more advanced, but only partially built, BMW-028 turbo-prop jet engine. This the Russians also captured when they overran Eisenbach, Erfurth, Stassfurth, Brandenburg and Nordhausen—BMW jet factories. The BMW-028 was the turbo-prop version of the BMW-018 engine. The Germans always indicated an improved model by jumping the first digit of the type number.

The M-028 (Russia merely adds the letter "M" to all captured German jet engine type numbers) is a 12-stage, axial-flow engine with annular (*Continued on page* 60)

NAVAL AVIATION'S

FLYING magazine presents on these pages an exclusive interview with Vice Admiral Donald B. Duncan, Vice Chief of Naval Operations and the Navy's top air admiral. Questions for the interview were prepared by FLYING'S editors and the following members of its Editorial Advisory Board: Maj. Gen. Hugh J. Knerr (Ret.), first Secretary General of the Air Force and Rear Adm. H. B. Miller (Ret.), former Chief of Navy Information.

Q. In discussing our Navy's role in the national defense structure, Admiral Duncan, it seems necessary that we correctly understand the meaning of those often-used terms, Naval power, sea power, and command of the seas. Will you kindly explain them?

A. Naval power comprises the combatant naval forces and their supporting forces necessary to control the seas. Sea power is a broader and more all inclusive term and is generally interpreted as including the merchant marine. It is the entire means involved in exploiting command of the seas so that your cargo and passenger vessels can go anywhere. Command of the seas means denial of its use to the enemy and the ability to use it yourself. The maintenance of sea power, of course, depends on the will and the ability of a nation to build and operate the naval forces and the merchant fleet necessary to maintain our position among the nations of the world, and to support the national policies, both foreign and domestic.

Q. When speaking of U.S. Air Power, some of our citizens apparently believe that the term refers only to the U.S. Air Force—with naval aviation regarded as an auxiliary service supporting the Navy. What is the Navy's concept of American Air Power in its entirety?

A. My concept of American air power includes not only the Air Force in its entirety, and Naval aviation, but also our commercial airlines, both passenger and cargo, our Civil Air Patrol and all other private aviation. It includes the will and the ability to build whatever aircraft and supporting facilities as are deemed necessary—and the will to fight if our national security is threatened.

Q. As command of the seas no doubt also connotes command of the air above those seas, does the Navy believe that its naval aviation is sufficiently powerful to achieve command of the air where it may expect to operate surface fleets during wartime?

A. We certainly expect to fight for and achieve command of the air wherever we decide to operate, anywhere around the globe. In fact, if we cannot fight for and gain local command of the air when required in any theater of sea warfare, we have no business being there. Such operations would of course be related to both land and air operations by other forces.

Q. It appears that our Navy has achieved its present dominant position among the world's sea forces by pursuing a policy based upon the Mahan Doctrine, which, in brief, asserts that command of the world's ocean highways has been proven by history to be essential to victory in war, even when that war was fought chiefly on land. In the light of the advent of air power and of atomic fission developments, does the Navy believe that the Mahan doctrine still holds good in the world today?

A. I believe that the Mahan Doctrine is still as sound as it ever was. However, it was enunciated long before the advent of air power or atomic bombs, so it has to be extended in other fields. The Navy has made that extension so far as Naval aviation is concerned. But it's an oversimplification of the problem to limit our thinking to the purely naval aspects. For instance, command of the seas implies protection of bases all over the world—and that may involve Army and Air Force forces as well. In short, the control of the world's ocean highways is an essential element of our strength whatever the means used to maintain it.

Q. Less well known than the Mahan Doctrine is the "Heartland" thesis first advanced by the British geographer, Sir Halford J. Mackinder, later exploited by Adolf Hitler's geopoliticians, and now apparently believed in by the Russians. Mackinder asserted that the nation winning control of the "Heartland," the greater internal part of Europe and Asia, soon could win control of the balance of Europe and Asia, and eventually of the entire world. Does the Navy believe that this new "Heartland" thesis weakens or even invalidates the doctrine of Mahan?

ROLES And GOALS

Vice Admiral Donald Bradley Duncan became a naval aviator Aug. 11, 1921, and has served continuously with Navy aviation since that time. His career includes staff duty with Fleet Admiral Ernest J. King; command of the USS Essex during attacks on Marcus and Wake islands; staff duty with the Commander in Chief, U.S. Fleet; Assistant Chief of Staff (plans) to the Commander in Chief, U.S. Fleet; Commander, Carrier Divisions 4 and 5; Chief of staff and Aide to the Commander in Chief, Pacific Fleet; Deputy Chief of Naval Operations (Air); Commander, Second Task Fleet; Deputy Chief of Naval Operations (Operations); and, on Aug. 1, 1951, Vice Chief of Naval Operations. Admiral Duncan holds the Legion of Merit, Commendation Ribbon, Presidential Unit Citation Ribbon, Victory Medal (Grand Fleet Clasp), American Defense Service Medal (Fleet Clasp), American Campaign Medal, Asiatic-Pacific Campaign Medal, World War II Victory Medal, and Commander of the Order of the British Empire).

Vice Admiral Duncan

A. The loss of Europe would pose a serious threat to the Western Hemisphere. But there would have to be many other factors to consider in extending the conquest of Europe into the conquest of the Western Hemisphere. The loss of Europe does not in my opinion imply the eventual loss of the Western Hemisphere. It would take a lot of scrapping to accomplish that. The seas and the air above them may indeed be open highways—but there'd be a lot of fighting along those unmarked roads before an enemy made a landfall here.

Q. Soviet Russia is reported by American naval spokesmen to have a submarine fleet estimated at some 350 vessels, many of them of the latest Snorkel type, of conventional craft and others of the Walther type of true submersible. In conjunction with the use of Soviet land based air power within striking distance of U.S. surface fleets, including aircraft carriers, is this not a serious threat to continued command of the seas by United States and British Empire naval forces?

A. It's a serious threat, but not an insuperable one. We are taking steps to prevent it. It's the same old question of the arms versus the armor. The balance changes from time to time—in fact, it's in a continual state of flux. Three years ago, for instance, the improved submarines posed a very serious threat. But we're in a much better position to deal with it today than we were three years ago. In fact, despite the improvements in the submarine weapon, we don't think that the Russians will come as close to success with it as the Germans did in the last war.

Q. Inasmuch as the Japanese in World War II lost the major portion of their navy to attacks by our air power —chiefly by action of our Navy's carrier-based aviation—how does the Navy visualize the possibility of a like experience at the hands of Soviet land-based air power?

A. There is no exact parallel. At the outset of the war the Japs had an expert Naval air arm. We had to dispose of that first—its destruction was a primary objective, and we achieved it quite early in the war. Thereafter our naval forces had to meet the challenge of shore-based air. The Kamikaze phase was difficult to counter and caused us considerable damage but was finally defeated. It represented a last ditch, desperate effort. Our Navy is trained to fend off air attacks by the use of highly trained fighter pilots in efficient aircraft, and by the concentration of tremendous anti-aircraft fire, both by conventional guns and by ship-to-air rockets. A fast carrier task force is not a push-over for any form of attack; it is something designed, built and equipped to fight back with ferocity. As an instance of that, you may recall that we had the fleet off Okinawa for seventy-two days. During that time we disposed of some 3,000 attacking Jap aircraft—and we never lost a carrier. That isn't to say that we didn't receive severe damage. But we kept our Naval forces right there on the job, despite the best that the attacking land-based Jap aircraft could do.

Q. As the Japanese sea supply lines from the East Indies and China were largely destroyed by the action of U.S. Navy submarines in sinking Japanese cargo vessels, does it suggest the possibility that our own supply lines to Europe and to the rest of the free world similarly may be cut by Russian submarines?

A. Our means of dealing with submarines will be immeasureably better than the Japs had—and that is taking into full account the improvements in the submarine during the past few years. We won't be caught with our periscopes down.

Q. In the event that our overseas supply lines are cut by enemy submarine action, is it practical that air transport could carry any considerable part of the load now carried by cargo ship?

A. I don't think so, at least with any aircraft we have today or that we may have in the near future. In fact, I don't believe that the time ever will come when all heavy, bulky cargo will go by air. Transport of anything costs money. The sea offers the (*Continued on page* 45)

An analysis of skyrocketing costs of aircraft and their equipment, plus a sharp comment on some phases of our military procurement policies.

WHY AIRCRAFT

Smaller and less complicated, this B-17 "heavy" bomber of World War II, cost but a fraction of today's comparable aircraft.

BY JOHN GILES

THE YEAR was 1923. The little fighter plane droned steadily through the hazy skies above Puget Sound. In the cockpit a test pilot stared intently out along the wing. At length, frowning, he picked up a pencil and scribbled words on a note pad strapped to his leg.

"Wing vibrates: beef it up," he wrote. And moments later: "Not enuf rudder control, make it bigger."

Such was the flight test and report on Boeing's PW-9. It underwent no wind-tunnel test. Structural tests were conducted by heaping sandbags on the plane until something popped.

Three experimental models of that plane were delivered to the Army—for $40,734.22.

Initial costs, like this, are relatively easy to calculate. It's more difficult to put price tags on all the research that goes into any airplane, for its development is a continuing thing as long as it remains.

For example, the development cost of the B-17 Flying Fortress, built in 1935, was $500,000. But research continued through 10 years of that bomber's service life. There were nine successive models.

Two experimental models of the fast, all-jet B-47 were built, test-flown and delivered to the Air Force and the Boeing Airplane Company says their cost was nearly $12 million.

"The difference in these two figures is quite staggering," says John A. McCone, who, as Undersecretary of the Air Force, has charge of all that service's procurement activities.

"However, when you consider this airplane has eight times the power and three times the weight of the B-17, the difference is perhaps not as significant as the dollar figures would indicate."

Members of Congress, faced with the task of appropriating more and more billions of the taxpayers' dollars for such things as airplanes, have taken a lively interest in the subject of steadily increasing costs.

And Mr. McCone recently gave the legislators a graphic example of one of the causes.

He displayed a section of the outer skin of the B-17, indicating its thickness, and a similar section of the B-47.

"Comparison of the two is a measure of the complexity of the problem and illustrates in a rather interesting way some of the complexities of the modern aircraft," he said.

Commented Senator O'Mahoney, Democrat, of Wyoming:

"A comparison of these sections makes it clear that the section of the new plane, which is roughly three inches by two inches, is altogether adequate for a paperweight, whereas the old one would be utterly useless as a paperweight."

The first Flying Fortress, a (*Continued on page 44*)

COSTS ARE RISING

Cost of this all-jet medium bomber (B-47) is fantastically high by World War II standards. Reasons: It is much bigger and heavier, and takes longer to manufacture.

Major General Knerr

Maj. Gen. Hugh Johnston Knerr was graduated from the U.S. Naval Academy in 1908, transferred to the Army in 1911 and won his pilot rating in 1917. He transferred permanently to the Air Service in 1924. He helped organize the first G.H.Q. Air Force and became its first Chief of Staff. General Knerr retired for physical disability in 1939 and was recalled to active duty in 1942 as Deputy Commander of the Air Service Command. He went to Europe in 1943 as Commander of Air Technical Service Command and in 1944 was given the concurrent post of Deputy Commander of the U.S. Strategic Air Forces in Europe. He returned to the U.S. at the close of the war to reorganize the Air Technical Service Command. In 1946, he became special assistant to the commanding general of the Air Force and in that post organized and became Secretary General of the Air Board. Two years later, he organized the office of inspector general for the newly independent Air Force of the U.S. and became the first Inspector General. General Knerr returned to inactive status in October, 1949.

Maj. Gen. Hugh J. Knerr (Ret.), a member of FLYING'S Editorial Advisory Board, prepared the following pointed comment on the problem of rising costs in the aircraft industry, after reading Mr. Giles' article, which begins on the opposite page.—THE EDITORS.

IN THIS PROCESS (of mounting aircraft costs), however, we must be realistic.

The burden of supporting and safeguarding the free world has become so heavy we must question the advisability of procuring more and more fantastic weapons when those we have already are adequate to the destruction of our enemy-elect.

The question arises as to whether the easy billions given to the military establishment may be creating an atmosphere of false progress for the sake of progress, rather than for the sake of national defense.

In a normal world situation, where every nation was on its own and we were involved in a war on our own account, certainly there could be no conservative approach to the problem of armament. Such is not the case. A modern war will be won or lost on the basis of industrial capacity. That capacity in turn is dependent upon the rewards of free enterprise, which cannot endure in an atmosphere of tax wastage.

That such wastage is current is apparent on every hand. For example, we simply can't afford the luxurious research establishments springing up in the military departments when private enterprise could do the job as well or better without the bureaucratic hangover certain to follow.

We cannot afford the unnecessary duplication inherent in the Navy program to create an Air Force and an Army of its own. We cannot afford the program of buying now under way in Army procurement agencies, much of which eventually will require another War Assets Authority to liquidate at less than 10 cents on the taxpayers' dollar.

It appears to be unreasonable to squeeze the taxpayer for faster and faster jet fighters, only to have him pick up the newspaper and read about a furious battle over MIG Alley, involving 137 jets, in which *three* Reds were damaged. We appear to have lost sight of the fact that fighter aircraft are provided for the purpose of destroying enemy aviation.

A billion-dollar dance in the sky that results in nothing more than a pleasant half hour for eager beavers with their tails on fire is sheer waste. Until we provide aircraft capable of at least a 10 percent kill per engagement enemy aviation will flourish and we will suffer.

It is time we stopped groaning about costs, cut out military luxuries, stopped this international shadow boxing and started to kill our enemies where they live. If we don't, he'll get us where we live—eventually. END

One of the cleanest airplanes now flying, the Vickers Valiant also is one of the fastest jets in the world. It will fly efficiently up to 55,000 ft. above 600 m.p.h. Inboard wing sections sweep back 45 degrees, outboard 35 degrees.

Britain identifies this Hawker P. 1067 as fastest jet interceptor in the world.

BRITAIN'S BID for AIR SUPREMACY

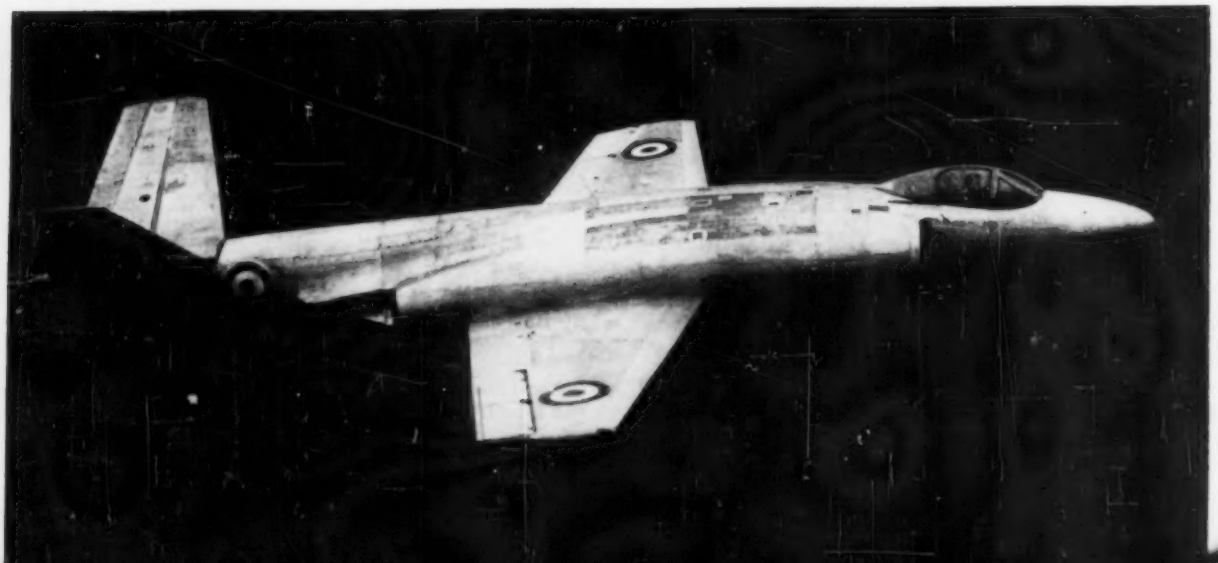
The Farnborough show of the Society of British Aircraft Constructors this year demonstrated that Great Britain is playing an important role in the race to capture technical leadership in the field of military aviation for the free nations of the world. The following article by Mr. Cain, a frequent contributor to FLYING, lists newsworthy highlights of the September show.—THE EDITORS.

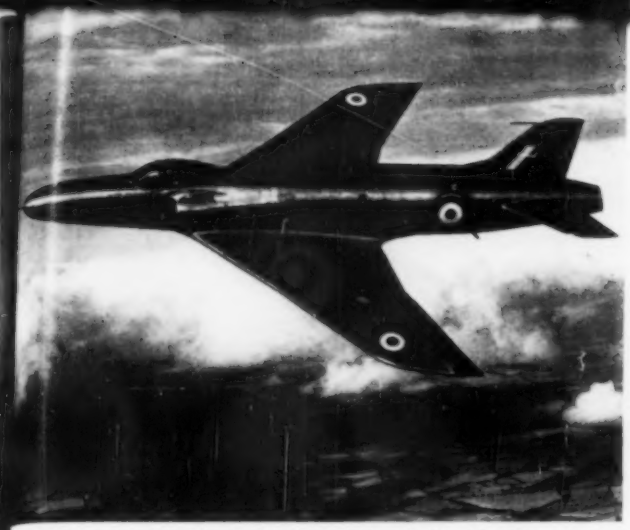
By CHARLES W. CAIN

LONDON.—Until the Royal Air Force and Naval aviation are strong enough to take the initiative in any future air war, Britain's strength must be seen from a defense angle.

This year the two-seat Armstrong-Whitworth Meteor Mk. 11 is in full production and a few are in squadron service. The Canberra

Straight wings and butterfly tail are distinctive features of the Supermarine 508, a fast deck-landing aircraft displayed at the show. It has twin Avon turbojets and carries heavy cannon. Maneuverability and speed are excellent.



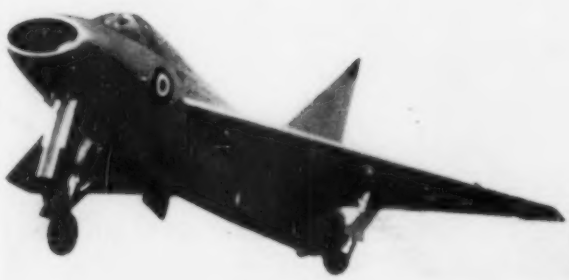


Another new RAF jet is the Supermarine *Swift* which has an Avon engine. Six factories are to produce this sleek fighter.

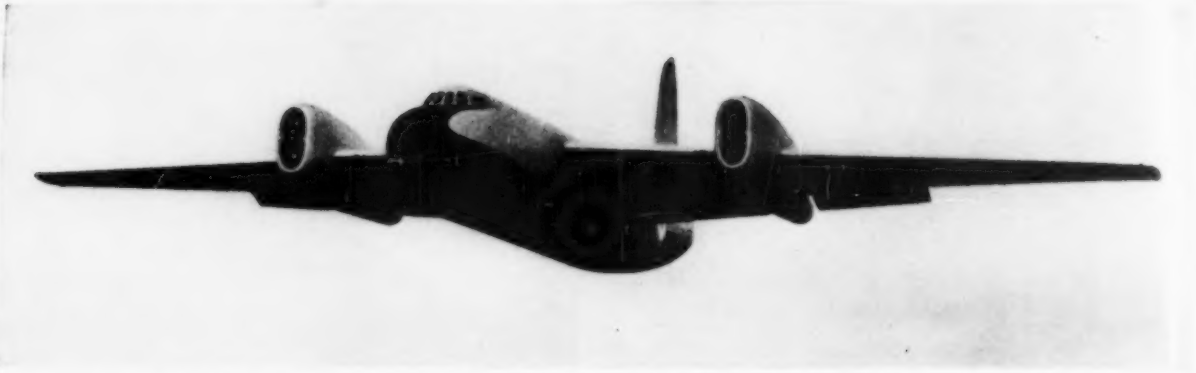
Armstrong-Whitworth's Meteor Mk. 11 has wing tanks with vertical stubs to aid jettisoning. Note flash guards over the 20 mm. wing guns.

Progenitor of the delta-wing bomber now under construction is the Avro 707, which is used for subsonic speed research. The 707s (the 707A is shown here) are powered by 3,500 lb. thrust Derwent engines. Takeoff run is extremely short.

A delta-wing Boulton Paul P. 111 approaches for parachute braked landing. A Rolls-Royce Nene turbojet powers the 111.



First all-weather fighter produced for the Royal Navy is this de Havilland *Sea Venom*. Twin booms make this side-by-side plane easy to spot.



The two-tier installation of Avon engines in the Short S.A. 4 created much comment at Farnborough. Most writers at the show were unimpressed by the Short 4's performance and question its future role in jet bomber squadrons.

has not yet appeared as a night fighter, although flight tests have confirmed its high suitability for that purpose. It is, however, in full production as a bomber and photographic reconnaissance craft. Also in full production are Navy planes, both piston and jet types. The Navy has a side-by-side night fighter with twin booms, the de Havilland Sea Venom Mk. 20, which is highly maneuverable.

From all-weather and night fighters, we go to the almost out-dated day fighter of the interceptor class. Top entrant is the Hawker P. 1067, which has the lines of a greyhound and the speed of a Russian jet fighter. Its close rival is the bullet-nosed Vickers-Armstrong Supermarine Swift.

Just as the Hawker P. 1067 is the modern version of the Hurricane, so the *Swift*, also in production for the RAF, is the logical successor to the *Spitfire*. Both are in the subsonic class. Armament of the P. 1067 has not been disclosed but the Swift has four cannons in the nose, each heavier in caliber than the Hispano 20 mm. In fact, the *Swift* may be the first fighter of British design to have armament comparable to the Russian MIG-15.

The Navy was represented in the interceptor class by the experimental Hawker P. 1052 which, like the later P. 1067, has rocket assist for interception and short take-off.

Strangest military aircraft in the show was the bulky, butterfly tail Supermarine 508, a single-seater reminiscent of one of the French prototypes at the Paris Aero show. The cockpit appears to be engulfed by two elephant-ear air intakes, which feed the powerful Avon axial-flow turbojets. It is a straight-wing job with tremendous speed.

In the non-flying exhibit was another Vickers product, the Type 538 Attacker. A large slipper tank under the fuselage provides that Guppy look characteristic of the new search aircraft. The Attacker is in full production for the Navy.

Summing up on the defense side, Britain lacks nothing except full-scale production, a matter which is receiving "energetic consideration."

Britain's attack force lacks the heavy punch which makes aggressors stop and think twice before lobbing bombs over the water. Britain still has to rely on piston engine Avro *Lincolns* and *Washingtons* (B-29).

Britain now has an A-bomber, the Vickers-Armstrong Type 660 *Valiant* Mk. 1 equipped with four Rolls-Royce Avons. It is Britain's sole serious attempt to get a medium bomber into the air and into service. The *Valiant* has been ordered "straight off the drawing board," which shows just how badly she needs an effective medium-range A-bomber.

I hesitiate to say much about the other British land bomber, the Short SA-4, which has Avon engines. Like all Short designs, the SA-4 is ruggedly built. The two-tier Avon installation has created much talk.

Another Avon-powered bomber is the new variant of the light attack *Canberra*, the B. Mk. 5 (being built by Glenn L. Martin as the B-57A) with its Wright J-65 axials. Only external difference noted is the new slab face bomb aimer's paneling (*Continued on page* 41)

The Blackburn and General 60 military freighter has bogie main gear. New version will have Centaurus engines.

Latest version of the Fairey *Gannet* anti-submarine plane is powered by a double Mamba turboprop engine.

SNEAK FLYING

If you must fly in marginal weather, do it the sensible and safe way.

By CHUCK LYNN

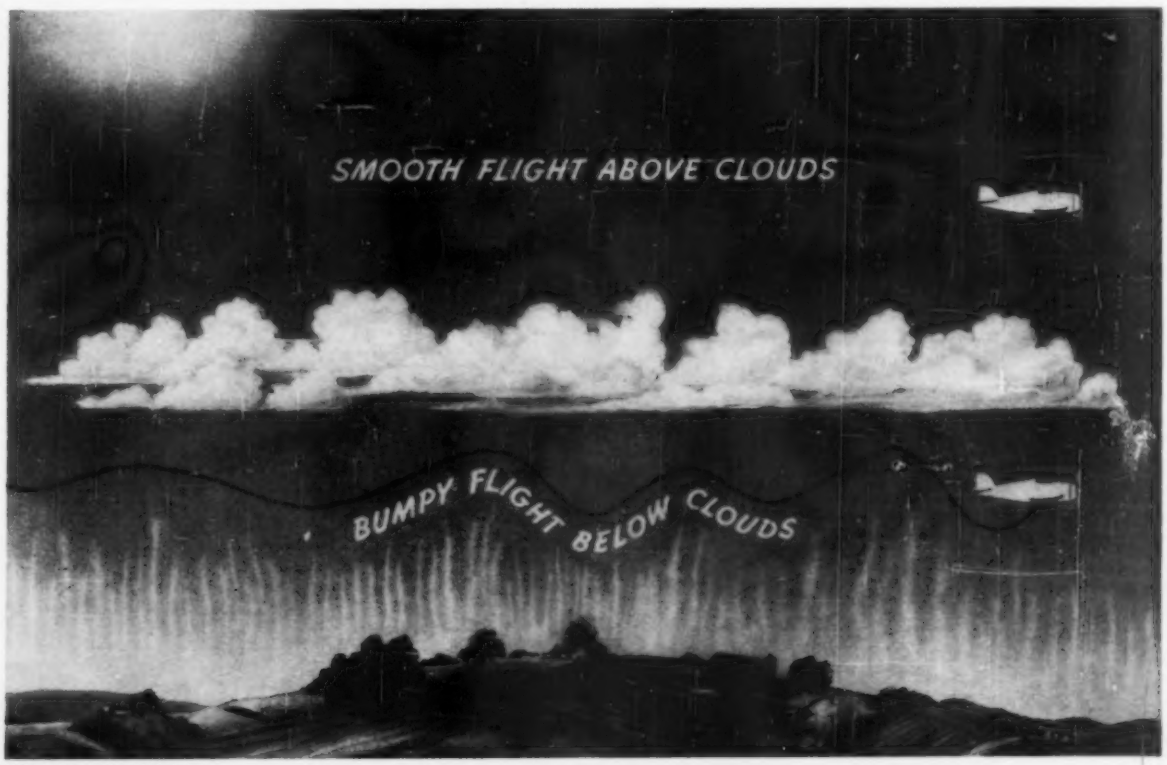
Author is a South Airways' pilot. He served as a pilot for the Chinese Nationalist government and was twice decorated by the Chinese Air Force. His 7,500 air hours were logged flying military planes, DC-3s and lightplanes.

THE weather at Red Bluff was down to only 300 feet and 1 mile. Russ Coldren had to get to San Francisco by night, in order to conduct a law suit the next morning. Already he had laid over an extra day waiting for the valley fog to lift. By noon he felt he could wait no longer. At the airport, the weather bureau men argued with him not to go. The airport manager threatened and pleaded. The entire Sacramento Valley was cursed with low ceilings and poor visibilities. Coldren's reply was that he'd flown the flight so often that he could do it with his eyes shut.

He bumped into the fog at 650 feet and leveled off just 300 feet off the ground. The ceiling gradually lowered him to 500 feet indicated as he skimmed over Corning, Orland and Willows. At Vacaville, he picked up the railroad track that headed toward the entrance to the San Francisco Bay from the valley. As he passed over Fairfield, he was in a sweat. The fog was now drizzling and, with no windshield wipers on his Piper, he couldn't see half a mile. He was now indicating 250 feet, barely 150 feet above the ground. Unknowingly, he took the wrong railroad track after it separated in town, and he followed it closely. At first, he started clipping little puffs of scud. Then he entered the solid fog. He must never have seen the tree as he hit it head on, 100 feet above the ground.

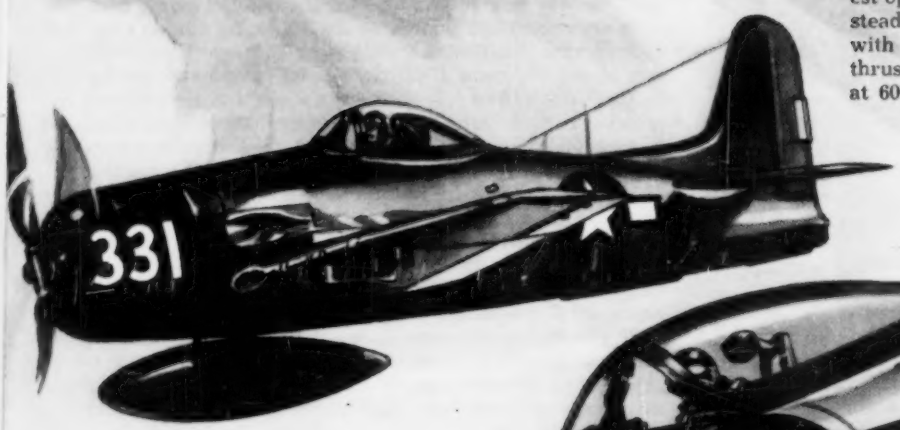
Last year, two other friends of mine were killed trying to sneak across a pass that was fogged in. Every week or so during winter, similar accidents make copy in the newspapers of the United States. Why? Mainly because in all cases the pilots were in aircraft that were not equipped for instrument operation. They were trapped trying to stay underneath heavy clouds or were in such a position that they were unable to avoid entering into them. The direct cause that killed my friends, and so many others, was flying marginal (*Continued on page* 51)

In marginal weather flying it is important to know the essentials of meteorology. Cumulus clouds indicate that the air beneath the formation will be turbulent and choppy yet you can fly above them and find clear visibility. But know your terrain—clouds can hide mountains.



HELLCAT
BEARCAT
and PANTHER

GRUMMAN AIRCRAFT and Engineering Corporation's 20-year progress in the field of Navy fighter plane development is graphically presented on these pages by Douglas Rolfe. The *Hellcat* (F6F) prototype took to the air in December, 1942, and did yeoman service with the Navy for the remainder of the war. Its rate of climb was 3,410 f.p.m., service ceiling was 36,000 ft. and speed was 371 m.p.h. The *Bearcat* (F8F) out-performed the *Hellcat* in all categories. Speed at sea level was 425 m.p.h., rate of climb (with water injection) was 6,500 f.p.m., and service ceiling was 42,300. Range, too, was improved. Grumman's transition to jets produced the *Panther* (F9F), one of the fastest operational fighters now flying. Improved steadily since 1947, it now has a J-48 engine with water injection. The engine's static thrust of 6,250 lbs. provides about 12,000 h.p. at 600 m.p.h. END



F8F-2 (Bearcat)

F9F-5 (Panther)

DOUGLAS ROLFE

STATIC THRUST: 6,250 POUNDS
COMPARATIVE HORSEPOWER
(Each complete symbol equals 2,000 horsepower)
F9F-5 at approximately 600 m.p.h.

F6F-5 (Hellcat)

COMPARATIVE CONFIGURATION

F8F-2

F9F-5

COMPARATIVE SPEEDS

F6F-5

F8F-2 — 371 m.p.h.

F9F-5 — 455 m.p.h.

600 m.p.h. plus

COMPARATIVE RANGES

F6F-5

F8F-2 — 1,040 miles

*1,650 miles

*1,200 miles

F9F-5

*(with drop tank)

F8F-2 2,500 h.p.

F6F-5 2,000 h.p.

The POLE VAULTERS

Every 48 hours, crews of the 58th weather squadron fly to the top of the world to gather weather data.

By JAMES H. WINCHESTER

EVERY 48 hours, usually in the gray, misty light of the early Arctic dawn, a jam-packed, overcrowded B-29, stripped of its armor and its guns, lifts its wheels off the world's longest runway at Eielson Air Force Base in central Alaska and points its nose northward.

Its peaceful target is the North Pole, a goal sought by generations of explorers, of whom few ever achieved success. For the dozen-man crew of the Military Air Transport Service's 58th Strategic Weather Reconnaissance Squadron, who have combined the miracle of the airplane with the miracle of electronics and navigation to conquer the most treacherous terrain and weather on the globe, it is just another routine mission. They call their flight "Ptarmigan," named after the wide-ranging Arctic bird.

On March 17, 1947, the 58th (originally known as the 375th Weather Reconnaissance Squadron) was handed the hazardous task of operating regularly scheduled weather reconnaissance flights from Alaska to the North Pole. This squadron has flown nearly 600 such successful missions to gather weather data at its source.

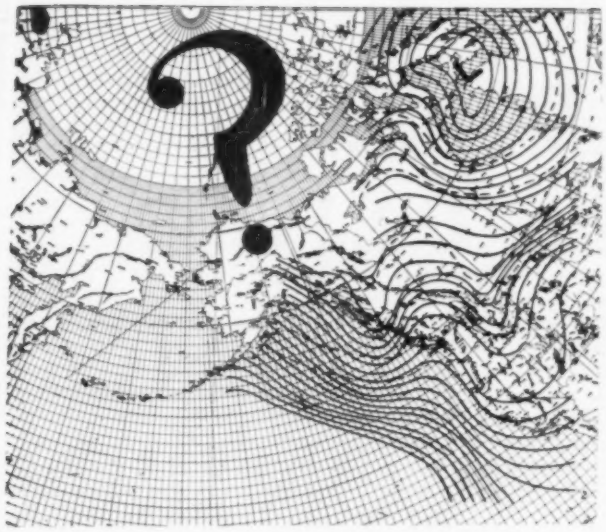
Comdr. (later Admiral) Robert E. Peary, USN, achieved immortality in April 1909, when he led his scanty expedition across the frigid polar ice cap to camp at the very top of the world itself—the first man in history to reach the North Pole.

From 1587, when the first attempt was made by John Davis, of Great Britain who got as far as West Greenland, until 1946—359 years later—the records of the National Geographic Society list 29 attempts by explorers using everything from sleds to airplanes to submarines to reach the North Pole. Only six of the parties—one by ground, five by air—succeeded. All were acclaimed by the world for their achievements.

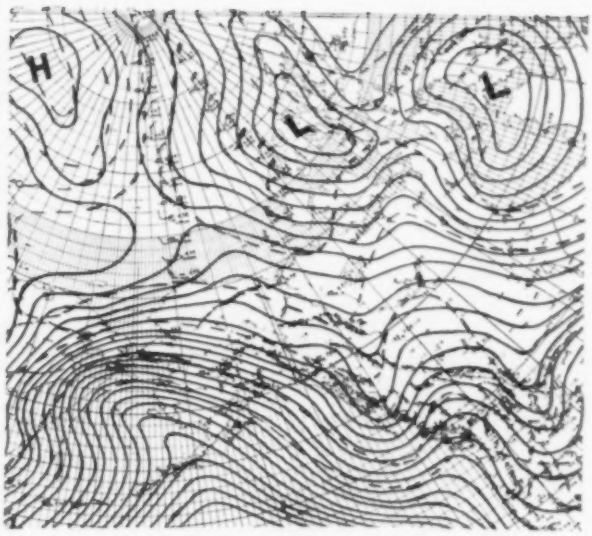
Today, crews of the 58th make the 4,000-mile round-trip from Eielson to the Pole in less than 17 hours. No one, except the ground crews servicing their airplanes, bothers to come out to watch them take-off or land.

"The indoctrination phase of our North Pole mission is

The B-29 takes off before dawn from Eielson on a routine Ptarmigan flight to the North Pole. The 4,000-mile round trip takes 17 hours.



Cold air masses which cause "weather" all over the U.S. are born in the Polar basin. Prior to the first weather flight in 1947, movement of these masses was thought to be impossible to plot.



The weather reconnaissance mission has eliminated the question mark. The information they plot on their routine flights is used as the basis for weather predictions all around the world.

now completed," Lieut. Col. Joseph O. Fletcher, commanding officer of the 58th, said this summer on the occasion of the squadron's 500th flight over the North Pole. "It's taken us this many flights to understand the Polar regions, aeronautically. We are now ready to embark on the routine phase."

Prime mission for the 58th is weather. Visualized as a huge weather factory, the vast, unexplored, uninhabited polar basin produces the cold air masses which, traveling Southward, produce a chilly day in Georgia or a squall along the Eastern seaboard. The squadron's assignment is to plot these developing air masses. They transmit the information to a central bureau where, coordinated with returns from land-based stations, it is used to forecast future weather around the world. Weather is born at the North Pole and the meteorologists of the 58th are the midwives at its birth.

More important than the weather data they gather is the invaluable backlog of polar flying experience being built up by this unique squadron.

The late General H. H. Arnold, World War II chief of the Air Force, who was largely responsible for "Ptarmigan" flights being inaugurated, was a firm believer that any future war will be fought in the Arctic. Shortly before his death, he told a West Point graduating class:

"Today the North Polar regions are the strategic center of the world. The first line of the nation's defenses lies now to the north, between America and any attack which will surely come over the Pole."

Known in Alaska as the "Pole Vaulters," members of the squadron know more about polar flying than any other group of airmen in the world. Their planes and specialized equipment have been proven in the sub-zero temperatures by actual test. The value of this reservoir of knowledge and experience cannot be computed in dollars and cents. In any polar war of the future, it will be our military ace in the hole.

In its four-and-a-half years in the Arctic, the 58th has knocked aside a lot of false assumptions about polar flying and upset many of the theories about this little-known region of the world.

First and most important problem licked by the Pole Vaulters was navigation. When they began their mission, it was known that magnetic compasses were practically useless near the North Pole because of their tendency to point straight down. Pilots feared twilight navigation in the area more than ice. They balked at the idea of penetrating the twilight band, primarily because they were of the opinion that heading checks could not be obtained due to the absence of visible celestial bodies during this period.

"Ptarmigan" crews now have proved that the period between disappearance of the sun and first sighting of the stars is sufficiently short to eliminate the twilight as a hazard. A great aid in connection with this has been the Pfund Sky Compass, an ingenious device which enables the navigator to take a bearing on the polarized rays of the sun after it has sunk below the horizon. A system of gyroscopic compasses has also been devised, which coupled with celestial bearings and radar information, give navigators today a good check on their course and speed.

Navigators are the most important men aboard any "Ptarmigan" flight. Each flight carries at least two experienced air plotters, sometimes three or four. Flying over the North Pole, where every direction is South, a little mistake can be a big one. At the Pole even time runs backwards. Over the Pole itself, as the plane is turned around in one of the most difficult feats of the entire flight, the crew goes from today to tomorrow, then back to today again in a matter of seconds as the ship swings around the International Date Line.

The navigators have to keep on their toes every second. Two years ago, one of them slipped up someplace. His plane and crew wound up across the world, on a frozen lake in Greenland.

Every "Ptarmigan" crewman is handpicked. Each is as expert in his own way as are the navigators. The pilot has to be thoroughly capable of flying his ship. The Arctic doesn't often give a second chance. The radar operator has the vital job of plotting ground speeds and drifts which are prime essentials in dead reckoning navigation. The engineer has to know his engines like a mother knows her baby, and he has to baby them even more. The radio operators have to know the vagaries of reception in the often severe magnetic storms that sweep the polar area. The scanners, who sit at the side blisters and keep the engineer and pilot informed of conditions beyond their range of vision, have to recognize trouble before it happens.

Then, there is the meteorologist. He is the reason for the flight. Sitting in the Plexiglas nose of the B-29, this flying weatherman is surrounded (*Continued on page 58*)

Heart of the new radar traffic control center is this microwave early warning system at Washington, D. C. airport.

World's First RADAR TRAFFIC CONTROL CENTER

Microwaves traveling at the speed of light are being used to guide civil and military planes into airports serving Washington, D. C.

An airport traffic controller in the tower "talking down" a plane by watching face of approach radar scope.

By CALVIN A. ADAMS

ONE of the good things which radar can accomplish is the control of air traffic in busy terminal areas. How well can radar do this job? Is it more efficient than present methods? If so, is it enough better to justify the high cost of radar equipment? How can air traffic controllers best use radar? Which kinds of radar are best suited for air traffic control? What changes are necessary in air-ground communications equipment and procedures?

The Civil Aeronautics Administration, with a substantial assist from the Air Force and the Navy, is seeking sound answers to these questions from full-scale tests in the Washington, D. C., area—one of the three busiest aviation centers in the country. There, by mid-1952 the first civil radar traffic control center will be watching and directing all air traffic over an area of 150,000 square miles. Already, it is operating in a limited way to guide Air Force planes around the congestion near Washington National airport to landings at Andrews Air Force Base, 10 miles to the east.

Key item of the control center is a giant radar transmitter squatting on the hill back of Washington National airport. This gadget, with weird horns and huge reflectors which grind around at six revolutions per minute, is the Air Force contribution to the center. Installed during World War II, this microwave early warning radar, called MEW for short, is capable of detecting aircaft more than 100 miles away. For traffic control purposes, its use will be limited to about 70 miles, which is considered its reliable everyday range.

Like all radar, the MEW sends out brief bursts of radio

energy, which are reflected back from such solid objects as aircraft. These radio pulses travel with the speed of light—186,000 miles per second. Even at this speed, the time required for the "round trip" of the radio pulse can be measured with extreme accuracy in the receiver portion of the radar equipment, and translated into distance from the radar transmitter. The direction of the aircraft, too, is accurately revealed by the reflected radar pulses.

In modern radar equipment, the information collected by the radar transmitter and receiver is displayed on the face of a large "scope," which looks very much like a television tube. The center of the scope normally represents the position of the radar itself. Concentric circles out to the edge of the scope show the distance in miles of aircraft or other objects. Aircraft appear as dots of light, or "pips," which show the plane's direction and approximate speed by comet-like "tails" trailing behind the dots.

The background of the scope is dark, with the aircraft pips, distance circles and other information "painted" by the radar in an eerie mustard-green light. As the radar reflector sweeps around the azimuth, a line of light "paints" a continuous fresh picture on the scope. In addition to the circles and aircraft pips, the positions of radio ranges, marker beacons and landmarks appear on the scope.

Six of these scopes, with 10-inch faces, have been installed in the radar traffic control center and connected to the MEW radar through underground television-type cable. Each of these scopes will be manned by a traffic controller when the center is in full operation. Two of these positions will be used for guiding aircraft out of the Washington area; the other four will be concerned with approaching planes.

Each of the four approach scopes scans a pie-shaped area covering about 90° azimuth, and extending out some 70 miles from Washington. This is done by off-centering the scope—an electronic trick which moves the apparent position of the radar from the center of the scope to the edge, and presents the radar view of a wedge-shaped, rather than circular, area.

The 40-mile radius close-in Washington area will be watched on two "Skiatrons," or VG-2s, contributed by the U. S. Navy. These massive affairs resemble glass-topped steamer trunks. The MEW radar view of the area is projected from below onto the glass top in a circle 25 inches in diameter.

In addition to being greatly magnified, this table-top radar presentation is quite different in appearance from that on the smaller scopes. The background on the VG-2 is white light, with aircraft pips and other data appearing in darker, purplish color. In good flying weather, there are so many planes in the air near Washington that the face of the VG-2 looks like a nest of crawling purple ants. Instrument weather reduces the number of planes sufficiently so that individual flights can be followed consistently.

One of the VG-2s, as mentioned earlier, is connected to the MEW radar. The second eventually will be attached to the shorter-range surveillance radar now in use by the control tower at Washington National. This second presentation will provide an independent radar "view" of the area, giving a double check on the close-in information collected by the MEW.

Radio communication panels stand beside each of the smaller scope positions, as well as the VG-2s. These will permit each controller to talk instantly, by voice radio, with the pilot of any aircraft in the area.

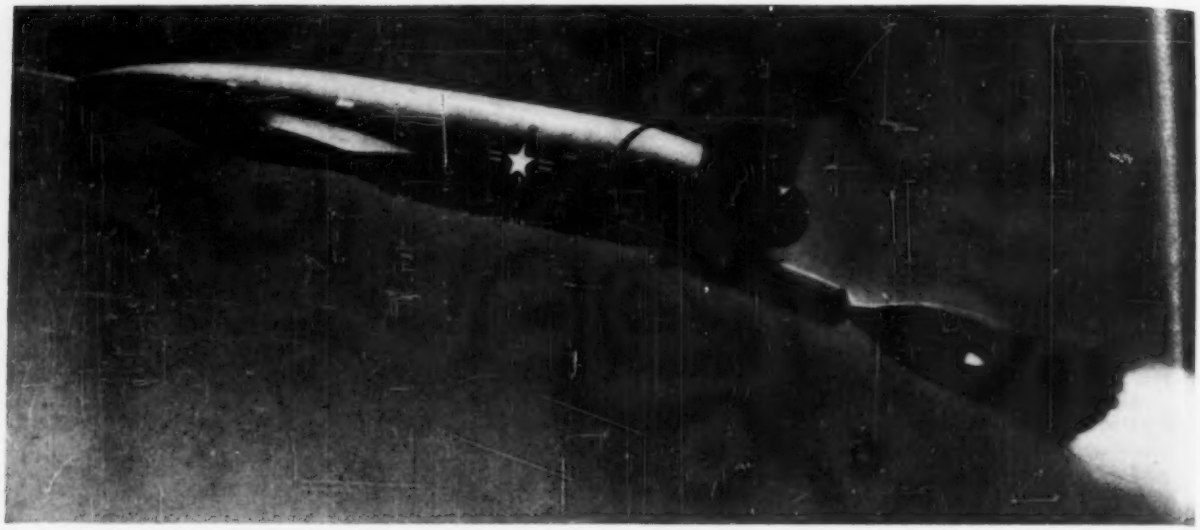
All this equipment is jam-packed into a small room in the Washington National airport, separated from the conventional air traffic control center by heavy black drapes. The drapes are necessary to prevent outside light from interfering with the controllers' view of the dim scope faces.

Because of the wide interest in the radar center, the CAA has provided a special window for "sidewalk superintendents." Spectators can peer through the window without interfering with operations, and even listen to radio conversations over a special loudspeaker provided for their benefit.

The conventional methods of airway traffic control depend upon position reports from pilots. Traffic controllers post these reports on slips of cardboard, together with information about the plane's altitude, speed, etc. By referring to these cardboard slips, the controllers keep aircraft separated by at least 1,000 feet of altitude and up to 50 miles in a horizontal direction.

Although horizontal separations are extremely wasteful of air space, they are necessary. Position reports from the pilots range in accuracy all the way from exact fixes to mere educated guesses. This is no fault of the pilots. As yet, they have no means of knowing their exact positions along an airway except at infrequent intervals when they pass over a radio marker. (*Continued on page* 56)

The eerie face of the Skiatron, 25 inches in diameter, glows beneath plastic markers (below, left) which identify aircraft "pips." Marker in foreground points to trail left by a plane moving in the area of the sky under observation. Specialists (below, right) move markers across face of Skiatron. In background are two small monitoring radar scopes.



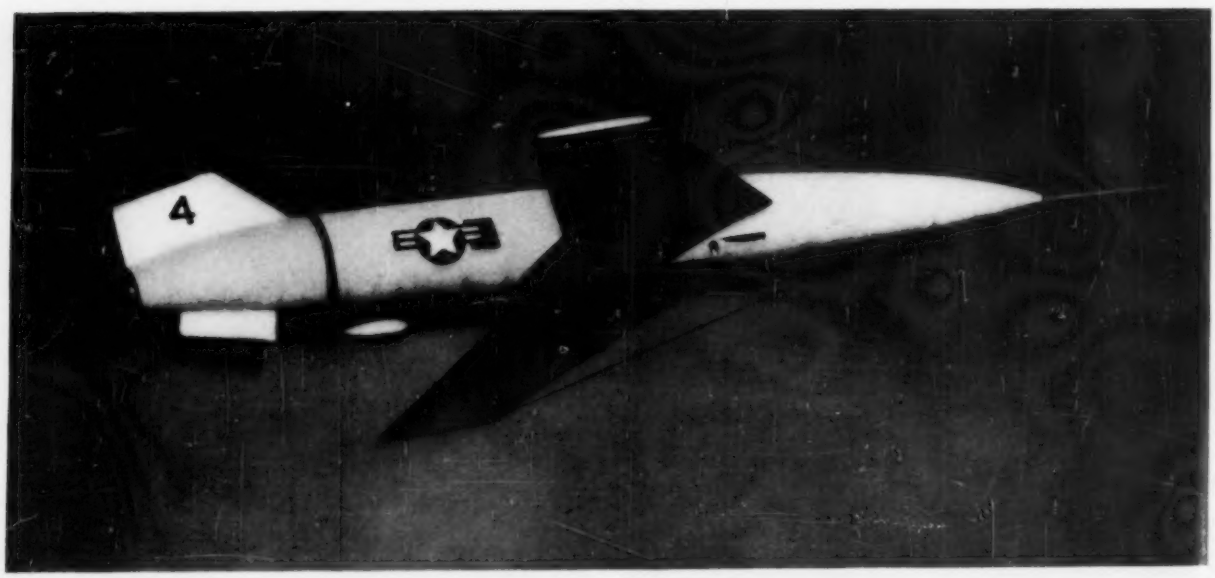
Spewing smoke and flame from an auxiliary rocket motor, the Air Force's new tactical guided missile, the *Matador*, streaks out over the Atlantic during a test. When the rocket bottle drops off power is supplied by a J-35 jet engine in the tail of the missile.

The Air Force's first

PILOTLESS BOMBER SQUADRON

Tactical air power takes on a new and deadlier look with the development of the rocket and jet powered Matador, a subsonic ground-to-ground guided missile.

An excellent close-up of the sleek, cigar-shaped *Matador* showing wing sweepback, antennae and position of jet powerplant. The missile is tracked by radar range stations on the ground and telemeter; information back to operators who guide it to the target.



ANNOUNCEMENT that the Air Force soon would activate its first squadron of tactical guided missiles gave the world an exciting, yet brief glimpse of one of the nation's most closely-guarded long-range military projects.

The craft selected for the Tactical Air Command's No. 1 squadron of pilotless bombers is the Martin-built *Matador*, a needle-nosed, sweptwing missile roughly the size of the F-80 jet fighter. It is a cigar-shaped craft with many of the external characteristics of another Martin product, the XB-51 ground support bomber.

The *Matador* is an all-weather weapon equipped with a rocket motor for takeoff power and a jet engine for effective range, and is filled with electronic equipment which permits it to be guided to its target with comparatively good accuracy.

Its effective range has not been disclosed but the *Matador's* assignment to tactical usage indicates that range is somewhat limited. As a tactical weapon, this new one-way pilotless bomber or unconventional piece of artillery would be fired against enemy ground installations in support of advancing troops.

Speed of the *Matador* also is a secret. However, it is reported to be faster than current operational jet fighters. That would place its minimum speed close to the 700 m.p.h. mark, which is relatively high for a single-jet aircraft despite an assist on take-off.

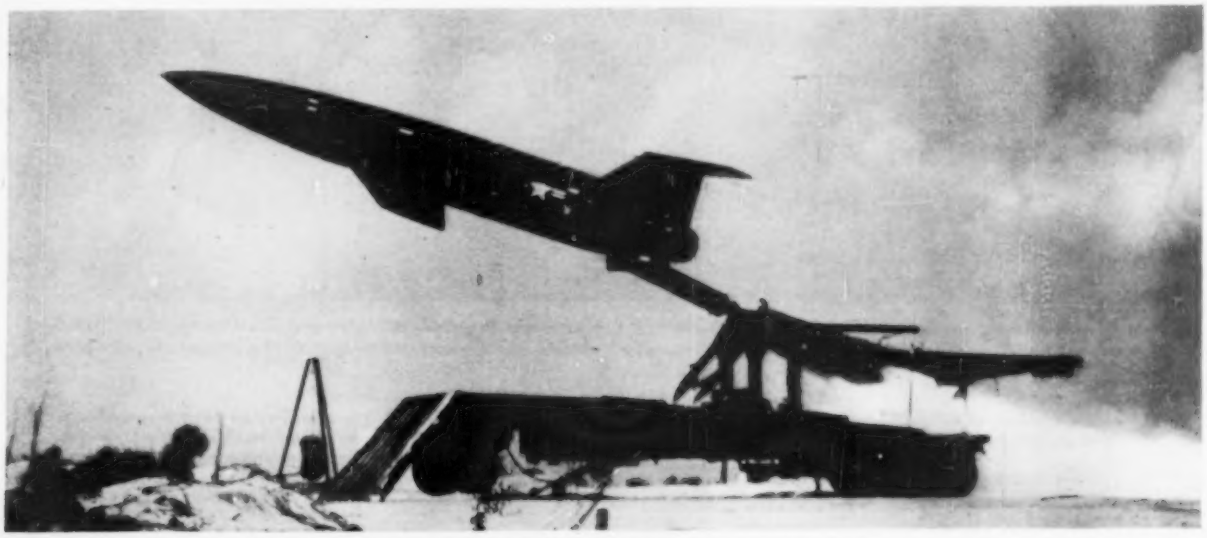
First flights of the *Matador*, under development at Martin for five or six years, were conducted at Holloman Air Force Base where, because of the limitations of the range area, it was flown only in circles and figure eights. It was not until the missile was transferred to the Air Force's guided missile test center at Cocoa, Fla., that it was fired in a straight line—out over the Atlantic. The *Matador* is tracked by radar ground stations.

The *Matador* is not, as press releases and newspapers identified it, a "fantastic" weapon for operational use. It is an unconventional weapon for training purposes. It is now under supervision of the 655th Guided Missile Wing, which is part of the Air Research and Development Command. No date has been set for its transfer to TAC. It is doubtful, too, that this missile could, in the present state of development, carry an atomic bomb in its warhead.

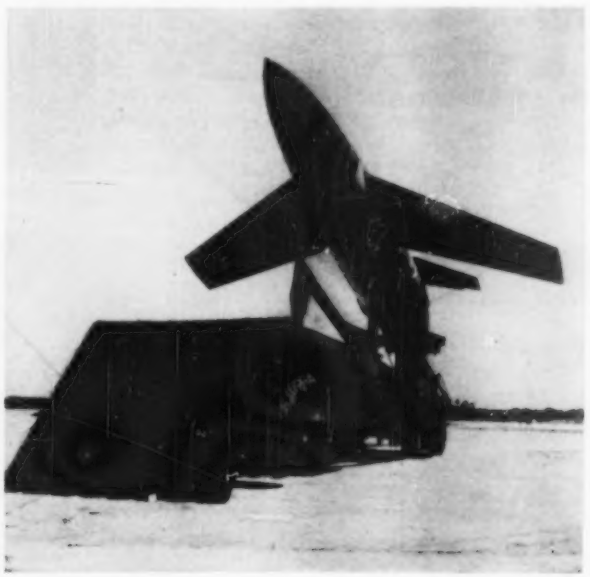
Informed observers identify the *Matador* as an early successful result of an intensive, long-range program of research in the field of so-called unconventional weapons, and only one in a large family of guided missiles now in various stages of development. It is understood to be the third, rather than the first, Air Force squadron of guided missiles. The others, not yet announced but now on test ranges, are in the field of strategic bombing and are supersonic.

Top-level defense officials were quick to point out, a few days after the *Matador* was publicized, that national safety depends now upon improved conventional weapons in the right quantity and of the right quality, rather than upon magic new weapons on the drawing boards or at proving grounds.

Secretary of Defense Robert A. Lovett said, in part: "Fortunately, there is enough truth in both the weapons development stories and in the progress reports on atomic energy to encourage a very optimistic outlook for improved American armaments. (*Continued on page* 56)



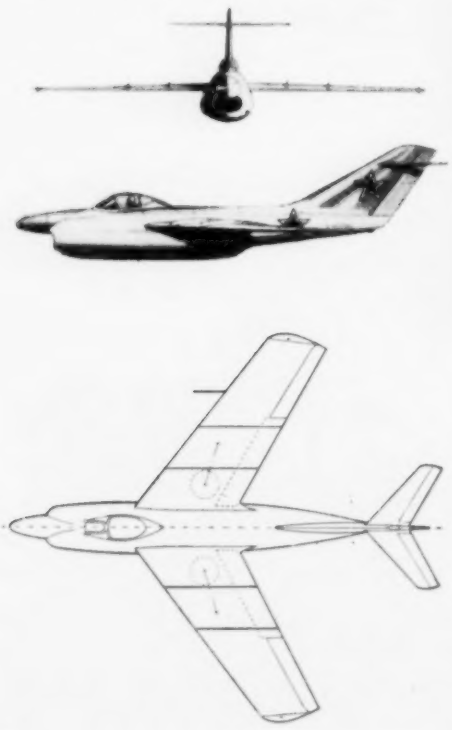
This is how the *Matador* looks as it is launched toward a target from the Cocoa firing range. The terrific blast of the rocket booster sends the missile away at tremendous speed. Below, how the "bird" looks just before it is launched out over the Atlantic ocean.



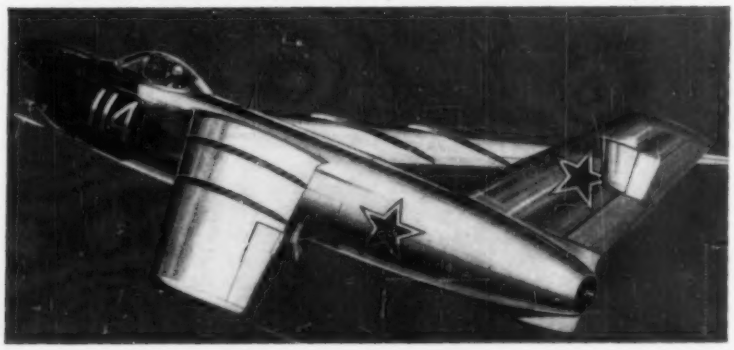
IF WAR COMES

Artist's conception of the Super-MIG which recently made a surprise debut in Korea. It carries provisional designation of MIG-19, but may be MIG-17 in Russia. Note radar snout, small diameter turbojets, improved streamlining. MIG-19 is bigger than the MIG-15.

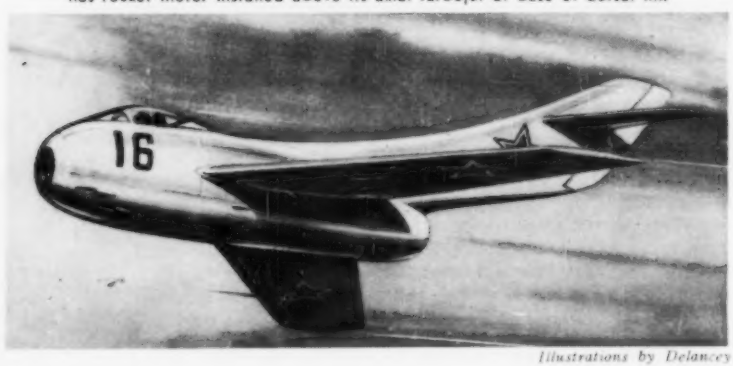
Three-view drawings of the Super-MIG, also identified by USAF in Korea as "flat" MIG.



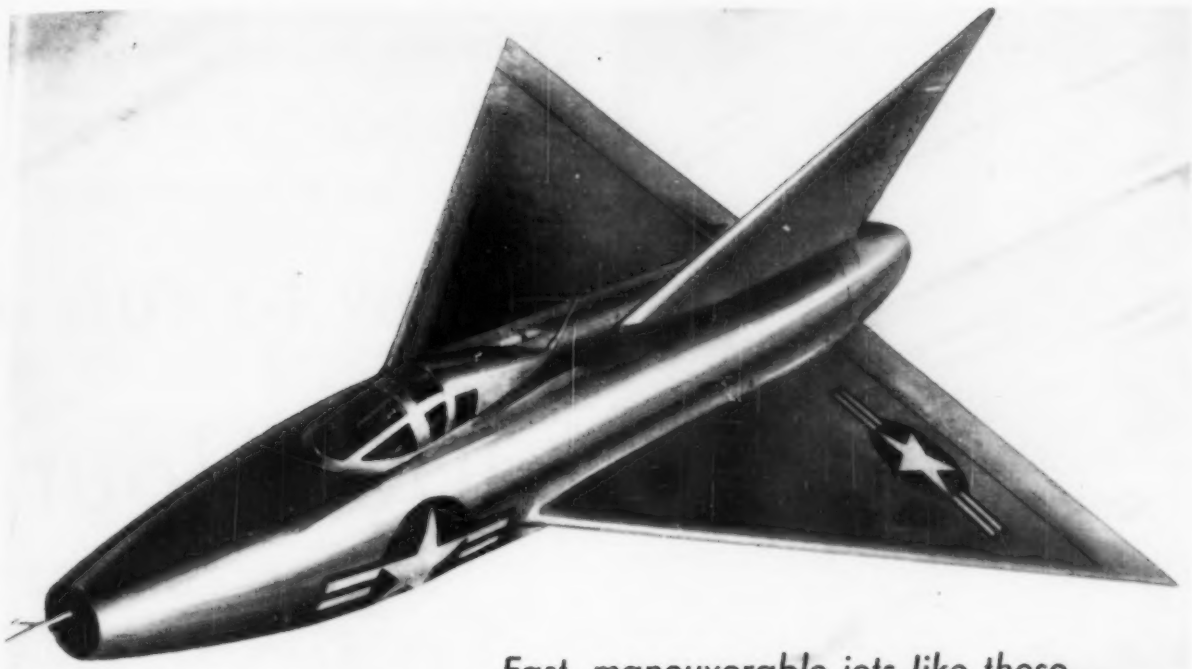
This sleek fighter, modified La-17, is another Red jet which may challenge our best aircraft. It has M-45 turbojet and an M-718 rocket engine.



This new, unidentified Red interceptor shows trend of Russian design. It has rocket motor installed above its axial turbojet at base of dorsal fin.



Illustrations by Delaney



Fast, maneuverable jets like these would battle for air superiority in any war in the next few years.

This Deltawing Convair F-92A is a research airplane but it forecasts configuration of new U.S. jet fighters soon to fly. Russia also is working on a supersonic Deltawing fighter, known as the Lippisch-designed P-13A, and Great Britain is testing two Deltawings.

By CHALMERS H. GOODLIN

and

JAMES L. H. PECK

THE FIRST of the Reds' self-styled "killer jets" has been committed to battle.

This larger, more-powerful, heavier-armed "super MiG" struck suddenly and dramatically from out of the Manchurian sanctuary, as the rising tempo of air war soared towards the long-expected climax.

But the appearance of this hottest of Red Air Force fighters, the MiG-19, was totally unexpected. This was the plane about which attaches and observers had shown such uneasy curiosity only this summer on the occasion of its debut at the Aviation Day display over Tushino Airport near Moscow.

They dubbed it "the flat MiG." And the jet is, in fact, much slimmer and more streamlined than its stablemate, the -15. With twin axial turbojets, the super MiG is reported by our sources as being in the 700-m.p.h. class.

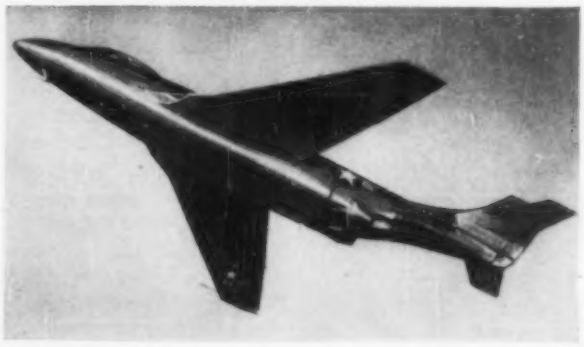
The appearance of this fighter in numbers holds grave significance. Our sources agree with opinions of FEAF *Sabre* pilots that the super MiG undoubtedly made its combat debut with ex-Luftwaffe airmen at the controls. Numbers of East German flyers have been operating for some time along "MiG Alley."

The very speed with which the new fighter was put into production—probably, our sources report, in new plants in the Far East zone of the USSR which are conveniently close to Manchuria—holds further serious implications for the United Nations.

Equally sobering is the "command decision"—unquestionably made in the Kremlin—to commit to battle outside the USSR this newest of Soviet fighters. It would appear that Chief Air Marshal Pavel Zhigarev was not boasting idly when he was quoted by *Pravda* as saying that the Soviet would "meet plane for plane, and type for type" the efforts of "the capitalist aggressors."

Here is the first pictorial evidence of the sort of aircraft with which the Reds hope to (*Continued on page 62*)

The F-88A McDonnell Voodoo is probably the best escort-support fighter the USAF can produce within the next two years.

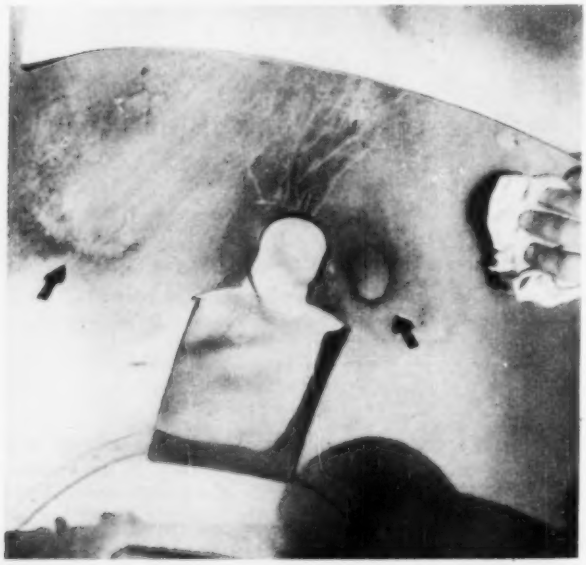


With time, care and common sense a pilot can do his own 100-hour engine check under supervision.

How to run a 100-Hour Engine Check

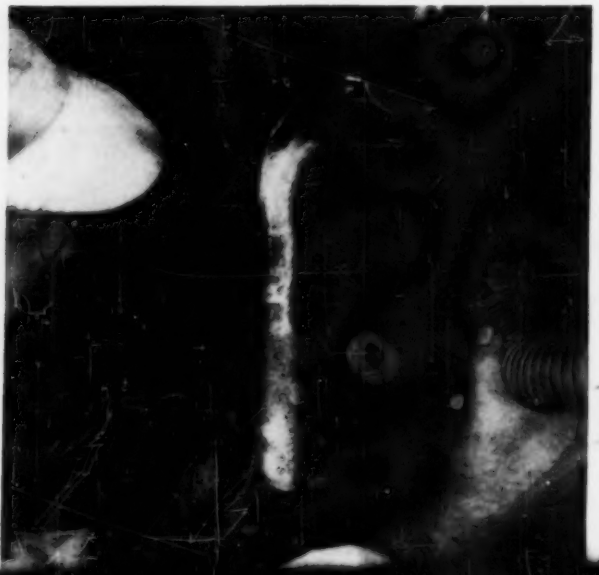
By RALPH KORNGOLD

Take off cowling and check it for loose Dzuses, cracks, signs of oil or exhaust leaks, and spare parts lying in the bottom.

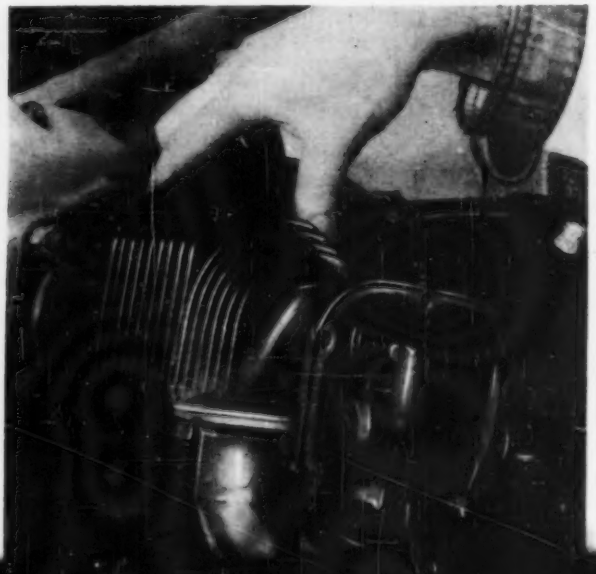


Fuel leak (left) and carburetor air duct chafing through cowling (right) mean a forced landing or sheet metal repair job.

To simulate flight vibration, shake manifolds, heater muffs and air ducts. Air duct (arrow) is wearing through engine mount part.



With valves closed and piston rising on compression stroke, propeller is pulled through. It should "pop" when thumb is removed.



"COULD I get you to take a look at my ship?"

The hangar chief withdrew his head from the engine compartment, grimaced as he straightened his back, and surveyed the young pilot with mock severity.

"Well, now I don't know, Johnny. Cost you money, you know."

"But I only want an estimate."

"In that case it's $5.00 an hour. Time and one-third for looking and double time for listening to sour engines!" For a moment he considered his friend's expression as he wiped his hands on a shop rag. Then his face broke into a grin.

"Just kiddin', Johnny. Where is this bucket of bolts you just purchased? That it out there on the end of the line? Let's go take a look. What seems to be your trouble?"

"Well, there's a lot of oil on the belly."

The chief's gaze covered the Luscombe approvingly. "Nice lookin' job, Johnny; at least on the outside." Groaning, he lowered himself to his knees and surveyed the offending oil smear. "Oh man, I hope this dog's in better shape than I am. Say—that is a helluva lot of oil. Way too much. Could be anything. Cracked case, maybe."

"Oh no! Migosh, it was just relicensed."

"Listen, Johnny, that doesn't mean a thing—not any more. Some guys will sign off anything. More than likely it's just a loose oil tank. Happens quite frequently. You'd do well to have us run an inspection and get you started right."

"Gosh, chief, I can't do it. Not for a while anyway. I barely had enough for gas to get home."

"Well, run the check yourself; you can do it."

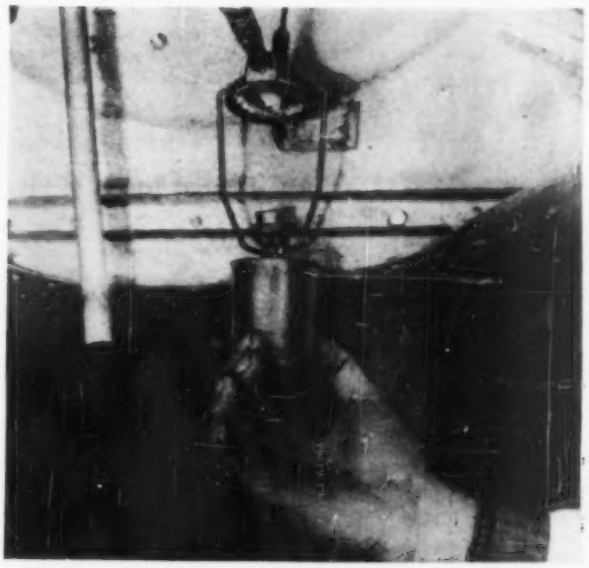
"Oh, I could get by on some simple thing maybe, but a regular 100 hour—I wouldn't know where to begin."

The chief assumed a sitting position with his back against the wheel. "Johnny, a '100 hour' is just a lot of simple things, one after the other. Anybody can do it who's careful, and uses his head. If you find something wrong you can always get some joker like me to fix it. If you run a good check, and often enough, you'll catch things before they get bad, and really save yourself some money. I'll tell you the system I use. Maybe in time you can improve on it. Just how would *you* begin anyway?"

"Well, I'd set the valve clearances for one thing."

"That's understandable. You get a tappet click in that Chevvy of yours and you really know about it, but Johnny on aircraft engines it doesn't (*Continued on page* 48)

Engines show a marked tendency to get rid of their carburetors. Wrench shows looseness without removing safety wire.



Fuel-line strainer checks show sediment bowl completely filled with water and die casting corrosion has closed off fuel outlet.

Plane's oil system depends on the oil tank drain for efficiency. So before doing anything else, tighten it up and make it secure.

Check for breaker points, distributor block and brushes by removing housing and rotor from case magneto; clean all parts.

Busiest Man in the Air Force?

All work and no play make Captain Grisham a very busy weatherman and fighter pilot.

Capt. Grisham of the Air Weather Service was first to complete 100 combat missions over Korea in F-80.

FRIENDS WHO KNOW him say that Capt. Leon Grisham, veteran combat pilot and Group Weather Officer of the 51st Fighter-Interceptor Wing in Japan, is just about the busiest man in the U. S. Air Force.

Between his daily weather forecasting and pilot briefings he seems to find time to tangle with MIG 15's over Korea. Recently he registered a new Air Force record when he became the only Air Weather Service officer in the Fifth Air Force to complete 100 combat fighter missions over Korea. He flies the F-80 *Shooting Star*.

The responsibilities of Captain Grisham are much more than those of the average combat fighter pilot. As Group Weather Officer and fighter pilot, he is admired and respected for his many achievements.

Waking up at 3.45 every morning, he first concerns himself with the preparation of daily briefing charts. This involves study of previous weather characteristics of two areas, home base and battle-torn Korea. Having studied past weather trends, he then forecasts the future weather, estimating cloud ceilings, bases and tops of clouds, visibility, turbulence, winds aloft up to 40,000 feet, icing conditions, rainfall and sunrise and sunset data. However, his work as weather officer has just begun.

"Weather briefing," said Captain Grisham, "consists of checking all incoming pilot and weather reconnaissance reports, analyzing all data picked up enroute and providing information to the pilots in the language they can understand."

He has held as many as 12 briefings a day.

Yet, even after taking off on a combat mission, Captain Grisham does not cease his weather activities. While in flight, he seeks what the average pilot would never look for—cloud formations and other data which will aid him in analyzing and modifying his daily forecast.

Captain Grisham has distinguished himself by receiving an impressive list of decorations, including three Distinguished Flying Crosses, 13 Air Medals, one Bronze Star and two Purple Hearts. In addition, he is credited with having damaged one MIG-15 in an air battle over Korea.

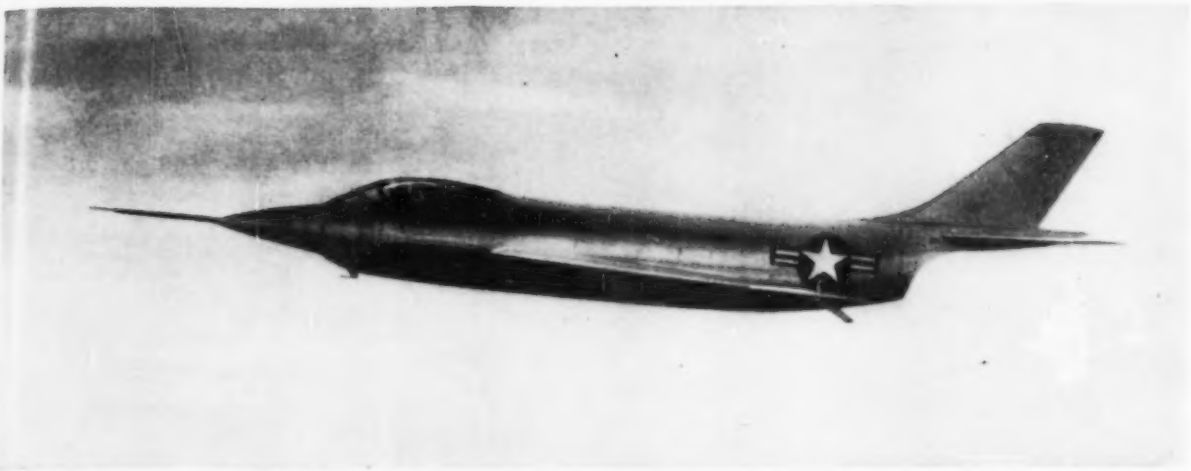
It was on March 1, 1951, while flying combat reconnaissance over Sinuiju, that he and three other pilots of the 51st Fighter-Interceptor Wing, tangled with 12 enemy aircraft. In a matter of seconds Grisham pinpointed a MIG-15 and hit it in the canopy and side of the fuselage.

"There was an explosion," said Grisham, "and a piece of the MIG blew off. He started to smoke, turned tail and headed across the Yalu."

Concerning the weather service in Korea, Captain Grisham said: "Our weather service has improved considerably since the outbreak of the Korean war. This is due to the added emphasis that we are putting on pilot reports, weather reconnaissance flights and the new mobile weather stations that have recently been installed in the front lines."

During World War II, Captain Grisham flew 41 combat missions over Germany in F-47's and F-51's and was credited with three ME-109's destroyed. On his 41st mission he was shot down while strafing the Ludwigslost Airdrome. He spent the remainder of the war as a prisoner in a PW camp at Follingbostel. END

Prior to take-off on a mission over Korea, Captain Leon Grisham briefs four jet pilots of the 51st Fighter-Interceptor Wing.

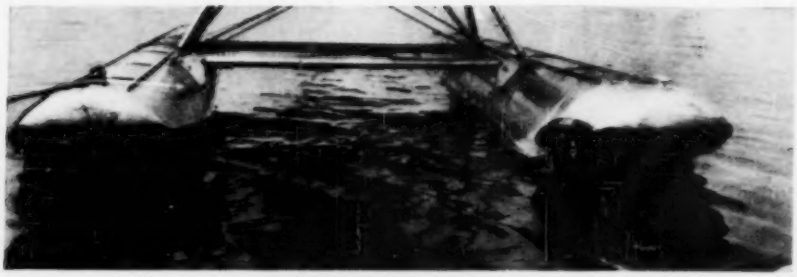


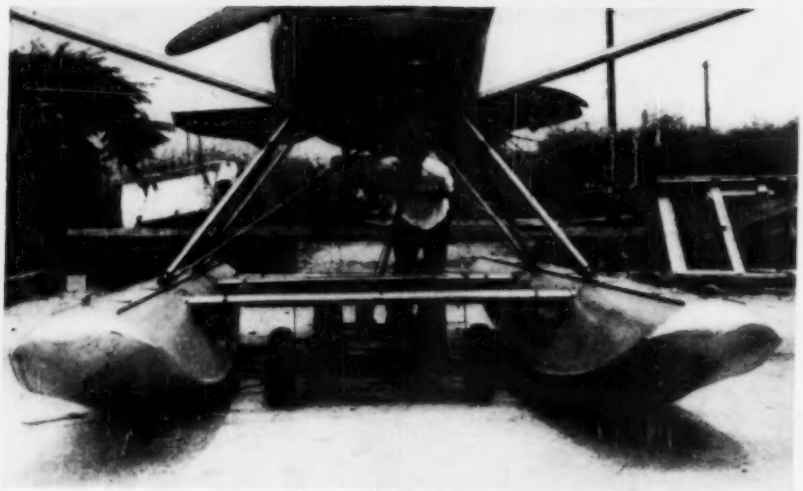
First flight photo of McDonnell XF3H-1 *Demon* shows Navy jet-fighter on test run over St. Louis. Specifications and performance are secret but contracts have already been assigned by the Navy to McDonnell and Goodyear Aircraft to produce the airplane in quantity.

HAVE YOU SEEN?

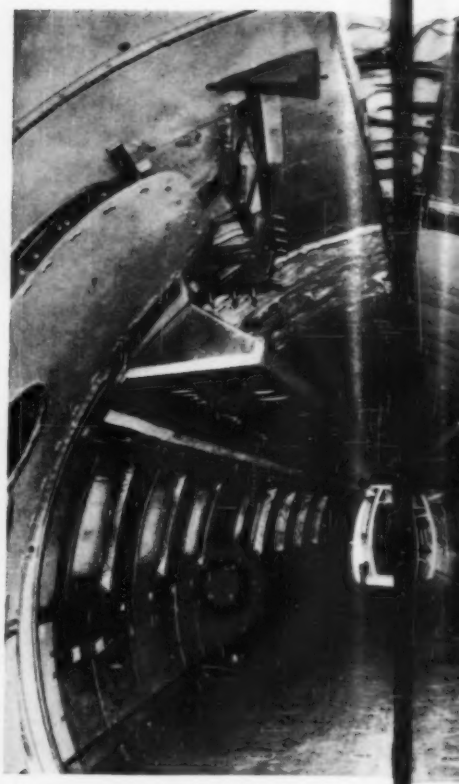
Helio *Courier*, four-place spin-proof metal and fabric plane, can be used as a liaison or executive-type plane. It cruises at 150 m.p.h. A 260 hp. Lycoming GO-435 has been installed.

Model 308, Cessna's new four-place military plane, can be used for ambulance, light cargo or observation work. Carrying a payload of 1,000 pounds, it has an 800-mile range. Features are safety landing gear and effective high lift-flaps. It is of all-metal construction.



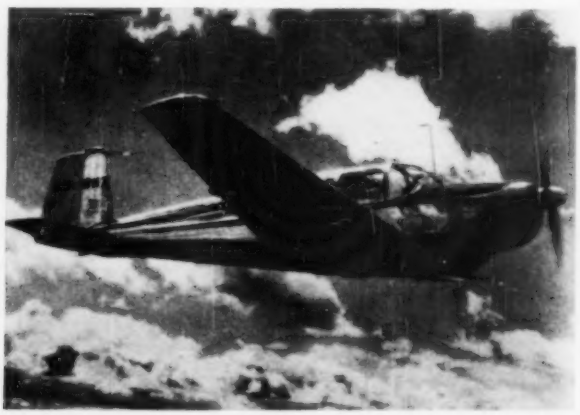


Floatplane splash fins (top), developed by president of Brooklyn Skyport, keep water from splashing into propeller and engine. Aircraft-owner Art Schoepflin built one-man docking dolly (bottom) for seaplane. Hydraulic jacks raise bars under floats and floatplane is moved easily.

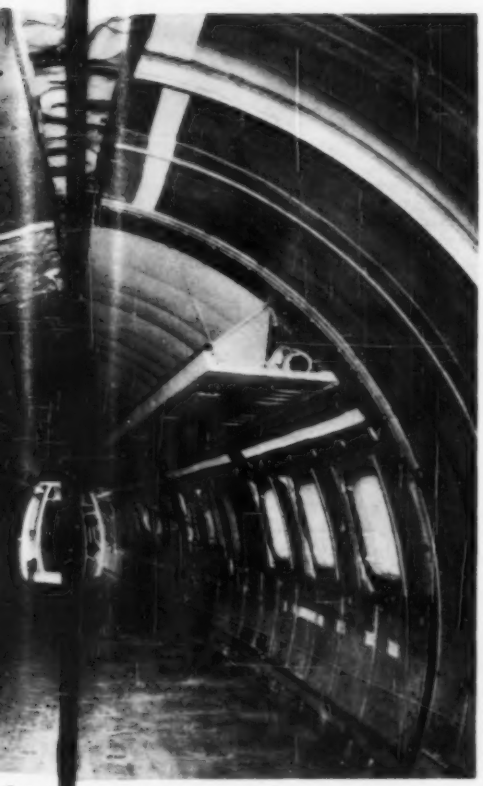


Longest transport cabin is Lockheed *Super Constellation's* which is 83 feet long. Various airline seating plans accommodate from 47

In order to reduce drag, glide path antenna is now installed in nose cap center of C-119, with plastic eye cover flush with nose.

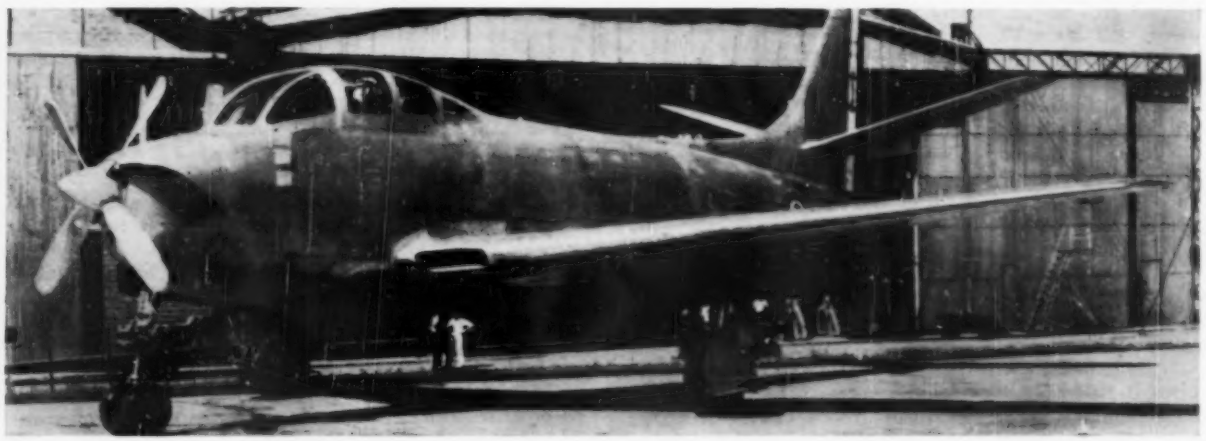


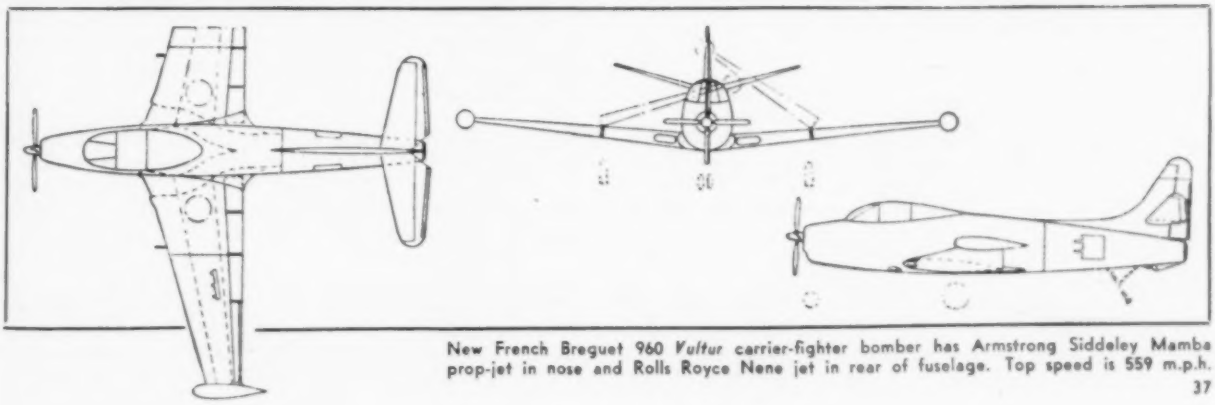
Improved Lycoming-powered SAAB *Safir* Sk-50 is new Swedish Air Force trainer. Swept-wing, Gipsy-powered version is used for research.



to 93 passengers. Military models are to be designed to carry 110 men. Passenger capacity has been increased 35%, cargo area 65%.

SO Ariel II, French gas turbine helicopter, is shown (top) taking-off in flight test at Le Bourget. M.F.-1 *Passero* is a new Italian single-place ultra-lightplane (bottom). Fitted with a 22-hp. Ambrosini or 20-hp. Macchi engine, range is 217 miles and top speed is 94.4 m.p.h.





New French Breguet 960 *Vultur* carrier-fighter bomber has Armstrong Siddeley Mamba prop-jet in nose and Rolls Royce Nene jet in rear of fuselage. Top speed is 559 m.p.h.

Passengers on the R4D were cold until the pilot made things hot for them.

I Learned About Flying From That! NO. 143

A Lieutenant Commander in the USN, the author has logged 6,000 hours.

By FRANK J. SHAW

WE WERE CRUISING the twin-engine R4D at 9,000 feet. There wasn't a cloud in the sky on that cold bright afternoon in 1945. Suddenly, I got all choked up; there were tears in my eyes; but this was not some reverent emotion. The plane was on fire.

I was a Navy transport pilot then, on what we referred to as FUBAR airlines, a ferry pilot shuttle service covering the eastern seaboard. On that September day, with a new co-pilot aboard, we had made a run from Floyd Bennett field, N. Y., to Naval Air Station at Norfolk, Va.

It was Friday, and while at Norfolk, we consented to take a full load of liberty-seeking service people back to the big city in the bucket-seat skytrain. Our airborne hitchhikers included Waves and nurses, along with the varied military rates. The air was smooth and we even had a tail wind climbing out of Norfolk over Cape Charles toward Manhattan where 21 passengers anticipated much gaiety in Gotham.

When we leveled off at 9,000, the Navy Douglas trimmed up perfectly. With reduced power settings, mixtures in automatic lean, one foot up on the fuel selector pedestal, a snappy dance band tuned in on the radio, this was really living. This was the way I liked to build up flight time! There was only one slight annoyance. It was just a shade cool. The passengers probably felt it more than we did in the cockpit.

FUBAR airlines had a reputation to uphold. Gene Donnelly, aviation machinist's mate first class, was the plane captain. I told him to open the heater valves in the passenger compartment and take the chill out of the air. That seemingly innocent, humanitarian operation almost brought about our date with destiny.

Did we get it warm enough for our passengers? I'll say we did. Almost burned 'em alive!

First we heard scuffling in the passenger compartment and then my carefully trimmed level flight was radically disrupted. Donnelly burst through the cabin door into the pilot compartment with smoke billowing after him. Leaning out of my seat and looking aft, the sight of flames, smoke and the screaming passengers struck me with a horror that'll never be forgotten.

There were no parachutes aboard and my human cargo was on the verge of panic!

I was on the verge of panic, too, but fortunately my reactions were immediate and correct. This just happened to be one of those situations that I'd often thought about. In the Navy they tell us an emergency that has been judiciously considered is not really an emergency when it occurs. Such was this predicament.

Despite the inky smoke burning my eyes and blurring vision, despite the acrid choking smell of hot metal and the distraction of screaming passengers, I lowered the landing gear and flaps, threw the props in flat pitch, turned off the gas, switches, batteries and everything else I could get my hands on and nosed over.

I had one relentless desire: to get that diving derelict on the ground. A second inclination without such tremendous urgency was to turn in those Navy wings of gold and remain on terra firma forever more.

I tried sliding open the window on my left but that caused the thick greasy smoke to whip past my face, making it almost impossible to breathe, let alone see. As I shut my eyes, co-pilot Don Harris must have opened his, because the smoke cleared my side of the cockpit and in the relative silence, sans engines, I could hear Lieutenant Harris coughing and choking in the smoke.

"Keep your window open," I yelled. I could make out the instruments. We were down to 5,000 feet. It seemed like an eternity. Donnelly had grabbed a fire extinguisher and gone aft to fight the flames. Were the passengers being burned alive? Would the wings stay on? My only definite knowledge was that I had to get that flaming pyre on the ground—but now!

We were down to 3,000 feet paralleling that magnificent straight stretch of road from Chincoteague to Cape Charles. This concrete concourse, despite its heavy traffic, telephone poles and wires, was going to be my landing field.

I looked a little off to the left . . . it was almost too good to be true. But, there it was, about a quarter of a mile away, wide, long and beckoning. A lovely landing strip. I will always be grateful to the planners of the East Coast air defense, for the Army Engineers who forged that flyer's field, for the Malfa airstrip, being in the right place at the right time.

We were down to 2,000 feet, high and fast to get on the strip. A DC-3 is not the type of aircraft that can easily be sideslipped, but this was a situation that would require a bit of muscled airmanship. It was like sitting on the front porch and steering the house. With the glide angle of an aerodynamic brick, we came down like an express elevator and flared out over the first part of the strip. During the roll-out run my anxious plane captain jettisoned the cargo doors. Before we completely stopped, the plane unloaded quicker than a subway during rush hour at Times Square. Don Harris and I were the last to go over the side.

(*Continued on page 59*)

CIVIL AIR PATROL

WING TALK

Cadet El Cigaro

THERE ARE HUNDREDS of amusing and exciting stories being told these days by and about cadets who took part in the International Cadet Exchange. One of the best comes to FLYING from the New Hampshire Wing—the amazing adventure of Louis Sargent, known now throughout Spain and New Hampshire as "El Cigaro."

High point of the Laconia lad's tour of Spain with four other cadets was the visit to La Crouna to witness a bull fight. Here, as honored guests, the CAP group enjoyed a lavish dinner before proceeding to the arena where a prize bull was to be killed in their honor. Last item on the menu was a big black cigar which Louis, not wishing to offend his hosts, tackled with feigned gusto.

Still puffing away, Louis and his friends arrived at the arena and the fights began. Excitement ran high as Spain's finest bull fighters threw caution to the winds in an effort to thrill the visitors from America who were seated in a special section, their chairs draped with golden capes. As the feature bout of the evening got underway, attention suddenly shifted from the bull ring to the box where the guests of honor were seated. Louis Sargent, his cigar still smoking, had passed out!

Regaining consciousness, Louis found himself in the bull fighters' private hospital. In a bed next to him lay Litre, one of Spain's greatest bull fighters. While cameras clicked and reporters swarmed about the room, Litre leaned from his bed to shake Louis' hand.

The next day Cadet Sargent's picture appeared in papers throughout Spain, captioned, of course, "El Cigaro."

Air Races Helps Fund

MICHIGAN WING'S Cadet Scholarship Fund is more than $4,000 richer thanks to a donation by the National Air Races committee. Cadets and Seniors handled ticket sales and parking of automobiles and aircraft during the Air Races.

Connecticut Wing News

CONNECTICUT WING CO, Colonel Charles B. Shutter, has announced the appointment of Charles Loftus, Director of the Office of Sports Information at Yale, as Commandant of the Wing's cadet program. Another prominent personality who has joined CAP is Nebraska's Congressman Karl Stefan, now a member of the Norfolk Squadron.

Airman of the Year

USAF's MAJOR Charles E. Yeager, first man to fly faster than the speed of sound, was named Airman of the Year by the foreign cadets who visited the United States during the International Cadet Exchange.

No Dues for Inductees

NATIONAL HEADQUARTERS has announced that CAP Senior members who enlist or are inducted into the armed forces may retain active membership during their period of service without payment of dues. To do this, however, they must file renewal applications which will be forwarded to them on December 1 each year by the unit to which they were assigned at the time of their entry into the service.

Scots Cop Trophy

A HIGH-STEPPING team of kilt-clad Scots marched away with the General Lucas V. Beau trophy in the International Drill Championship held recently at the Canadian National Exhibition. Representing the Air Training Corps of Great Britain, the Scots defeated crack drill teams representing the United States and Canada, scoring 367 out of a possible 400 points. American entry was the championship New York Wing team which won the U. S. National title last July.

Operation Bloodlift

AS A RESULT of Operation BLOODLIFT, National Capital Wing pilots may soon be making weekly flights to deliver blood to outlying areas, according to Malcolm Baker, assistance administrator of the District of Columbia's Red Cross Regional Blood Center. During the recent demonstration, 34 planes manned by CAP and civilian pilots airlifted nearly 3,500 pints of blood between Frederick, Md., and Washington, D. C.

Official Air Arm

WHEN Governor Sherman Adams signed into law House Bill No. 107 recently, CAP's New Hampshire Wing became that state's official "Air Arm of Civil Defense." Introduced by Laconia's Colonel John F. Brown, the bill also provides for an appropriation of $20,000 to assist the Wing in carrying out its missions.

SARCAP Emphasized

SARCAP MISSIONS continue to be the chief item of all Wing training schedules and evidence that these realistic maneuvers are paying off is contained in a recent message by Colonel Richard T Kight, CO of USAF's Air Rescue Service. "CAP," according to Colonel Kight, "has participated in 70 per cent of all ARS search missions . . . in the United States."

Montana Wing recently completed a two-day SARCAP mission, covering an area of 4,800 square miles, while Wyoming Wing sent 150 people and 35 aircraft on a similar maneuver that drew high praise from USAF experts at Lowry AFB. A few weeks later, Washington Wing rated a "superbly done" by putting more than 50 planes in the air during their SARCAP exercise.

NAA President

COL. DONALD D. WEBSTER, popular head of the National Capital Wing, is the new president of the National Aeronautic Association.

Forest Lift

MARYLAND WING flyers have taken to the air in an assault against Oak Wilt, a disease which threatens America's most useful trees. The Maryland airmen, at the request of the Department of State Forests and Parks, are flying forestry experts over a 900 square mile forest area in an attempt to locate infected trees so that ground parties can move in to halt the spread of the dread disease.

Station CAP

CAP's NATION-WIDE radio network continues to grow, with more than 9,500 FCC-licensed stations now on the air. More than 75 per cent of the stations are either airborne or mobile, making them available for quick movement into disaster areas where fixed communications have been destroyed or made unserviceable.

Cadets from Brazil

THE INTERNATIONAL CADET EXCHANGE provided an active and fruitful summer and was deemed a success by all those involved. Cadets from all over the world were guests of State Wings and many of our cadets returned the call.

South American countries were well represented in the United States. A group of cadets from Brazil were guests of the Massachusetts Wing. Accompanied by adult sponsors, they spent the three weeks of their stay touring the United States.

Washington, D. C. was one of the highlights of their visit. Below, four of the Brazilians pose, with the capitol dome in the background, while they do a little skyline gazing.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960, Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

SHOOT YOU DOWN?

AOPA recently sent a strong protest to both CAA and the Air Force as the result of a nationally-distributed Associated Press dispatch that originated in Milwaukee, Wis.

The dispatch quoted a CAA communicator in Milwaukee as saying that the new Air Defense Identification Zones along the Canadian border would not only be enforced by military fighter planes, but that civil aircraft violating the ADIZ regulations would be "shot down."

AOPA's telegrams asked both the CAA administrator and the commanding general of the Air Force's Air Defense Command for verification of the Milwaukee official's statement, and for an explanation.

The Air Force referred the matter to their Washington headquarters. CAA launched an immediate investigation, and have given AOPA this report:

The CAA communicator in Milwaukee was misquoted by a careless newspaperman.

CAA contacted the editors of the Milwaukee paper where the story originated, and they (the editors) are now investigating the facts behind the erroneous article.

AOPA's primary concern in the matter was that such a widespread report, even though erroneous, can quickly become accepted as fact. The new ADIZ's are no different from those that have already been in effect from some time, and their requirements are the same.

Above all, AOPA objected to the implication that fighter planes would actually shoot down civil planes.

AIR FORCE GRAB?

AOPA has been trying for some time to get a public hearing in the matter of an Air Force proposal to take over the Lincoln, Neb., airport on a joint-usage basis.

Following a number of requests for help from members in Nebraska, AOPA made its original inquiry some time ago, was promised by CAA that nothing would be done in the matter without its first being considered by the CAA's Airport Use Panel, before which public hearings would be held.

Though AOPA National Headquarters got no further word from CAA, reports from Nebraska persisted that negotiations were being conducted behind the scenes between the Air Force and Lincoln city officials. AOPA also has received reliable information to the effect that meetings had been held with airline officials, and that an agreement was presumably being worked out that would permit no other civil operations from the Lincoln airport but those of the airlines.

Fearing a repetition of the maneuvers used by the Air Force and city officials to take over the Wichita municipal airport, AOPA has again requested open public hearings on the Lincoln proposal.

AOPA's MAP SERVICE

Volume of AOPA map sales in the past three months has tripled, according to AOPA's Map Service director, Beverley Royen. A total of 13,230 aviation maps of all types were sent out during that three-month period. Reasons for the greatly-increased volume include the summer season, the fact that the U. S. Coast & Geodetic Survey recently discontinued all aviation map dealerships (thereby eliminating the supply of current maps at most small airports throughout the country), and the fact that AOPA has accomplished a considerable speed-up in the handling of map orders.

The current volume of map sales is running about 75% subscription (limited to Sectionals and World Air Charts), and 25% individual orders (any type of map can be ordered in an individual order).

RESORT AIRPORTS

AOPA's Flight Service director, Lee Wright, is completing a revised and expanded list of resort airports throughout the country. It is estimated that AOPA's new resort-airport list will be available shortly, and will cover 600 selected fields.

BUSY FLIGHT SERVICE

Foreign and domestic flights are being handled for AOPA members at a rate of nearly 100 per month, AOPA's Flight Service department reports. Of all flights serviced, 64% are within the continental United States, 36% are to foreign countries throughout the western hemisphere.

ACCIDENT STATISTICS

The latest AOPA Confidential Newsletter contains detailed accident statistics for 1949 and 1950 covering the 17 most widely-used types of personal planes in the country. The data were compiled by AOPA from Civil Aeronautics Board statistics, and contained a detailed study of each of the 17 plane types, by name.

The table covers 59% of all non-airline civil planes certificated in 1949, and 64.5% of those certificated in 1950. Some interesting general facts:

Of the 60,921 planes certificated in 1950, 7.2% were involved in accidents. Of those accidents, 10.9% were fatal, 8.1% involved serious injuries, 15.2% involved stalls, and 7.9% involved weather.

The table gives detailed statistics for the following planes: Aeronca *Champion*, Aeronca *Chief*, Aeronca *Sedan*, Beech *Bonanza*, Cessna 140, Cessna 170, Cessna 195, Ercoupe, Luscombe 8's, Piper J-3, Piper *Super Cruiser*, Piper *Clipper*, Piper *Pacer*, Ryan *Navion*, Stinson *Voyager*, Temco (and Globe) *Swift*, Taylorcraft B's.

OMNI TROUBLE-SHOOTERS

AOPA is cooperating closely with a special committee set up by the Government's Radio Technical Commission for Aeronautics (RTCA), of which AOPA is a member. The committee's job is to gather as many case histories as possible on troubles experienced by pilots and plane owners with airborne omni equipment. AOPA has asked all members to send such reports to National Headquarters, and include such information as the number of operational hours on the receiver, instances in which the receivers appeared to be operating normally but gave wrong bearings, magnitude of errors, time, place, date, and any other pertinent information.

Chairman of the special committee is James Riddle, Jr. (AOPA 1362), president of Narco.

"OMNIGATION" POPULAR

AOPA's Pilot Service Bulletin No. 13 ("Omnigation") has just been adopted for use at a large Air Force training base. Air Force officials requested AOPA's permission to use the booklet to train Air Force pilots.

"Omnigation" is one of AOPA's most widely-distributed publications. It has been sent free to AOPA members on request, is used as a standard study text by CAA, and a copy of it accompanies each new omni set delivered by Narco.

Incidentally, the term "omnigation" was coined by AOPA, and has come into wide use.

THOSE ADIZ AREAS

New Air Defense Identification Zones (ADIZ's) have now gone into effect. There now are nine domestic ADIZ's, and international ADIZ's covering the Canadian border, parts of the Atlantic and Pacific coasts, and part of the Mexican border.

AOPA has just revised its widely-distributed AOPA Special Report "Security Control of Air Traffic," which deals with the ADIZ areas and their requirements. The first issue of that AOPA report, dated January 17, 1951, was widely distributed. The new revision, bringing all ADIZ's and requirements up to date, has just been printed and is being sent free to all AOPA members with the next mailing of the Confidential Newsletter.

This AOPA Special Report interprets the regulations in simple language, and offers members advice on how to understand and use the new zones. AOPA had the close cooperation of Government officials in the preparation of the Special Report, and the layman's interpretation of Part 620 of the Civil Air Regulations which covers the ADIZ's and their requirements.

Britain's Bid

(*Continued from page 20*)

directly under the nose. Another new modification, the PR Mk. 3 for photographic reconnaissance also was flown here.

One of the most sensational performances in the air display came when Test Pilot Zurakowski took up the Gloster G. 41, a ground attack Meteor Mk. 8, armed with 24 95-pound rocket projectiles. Displayed but not flown was the Sapphire *Meteor*, recently in the news for its climb to 40,000 feet in just over three minutes.

Submarine attack is a major worry over here and for this reason the portly Avro 696 Shackleton Mk. 1 is a vital link in the attack-defense chain around the United Kingdom. The Shackleton has Rolls Royce Griffon piston engines driving counter-rotating propellers, which give it a distinctive appearance.

Two other sub chasers are the redesigned Fairy *Firefly* Mk. 7 and the turboprop Fairey *Gannet* Mk. 1 now in production for Royal Navy carriers. The new version has an extra cockpit and a third crew member. The props are driven by the Double Mamba. Wings fold twice.

Last of the new Navy jobs is the latest version of the contra-prop torpedo fighter, the Westland *Wyvern* Mk. 4. It carries an 18-inch torpedo, wing rockets and jettisonable fuel tanks. It is in limited production for carrier operations.

In the field of training aircraft, there was nothing much new at Farnborough. They are: The de Havilland DH 115 *Vampire* with twin booms; the Boulton Paul 119, with side by side seats; the *Chipmunk* now in large-scale production for British and Commonwealth air forces; the Percival P. 56 *Provost*, a piston engine side-by-sider for basic training; the Auster J5F *Aiglet* trainer (a three-seater); the twin-engine Wickers-Armstrong Type 668 *Varsity*, a variant of the *Viking* transport; the Percival P. 57 *Pembroke*, the P. 57 *Sea Prince*.

The most significant trend in 1951 was toward the delta wing plane. Since America has been remarkably quiet on her own progress, it is fair to suggest Britain leads the field. Certainly, no one could fail to be impressed with the all-around performance shown by the deltas flown in the air display.

There is more than a hint that Britain intends to produce a plastic plane for high-speed research. Guided missiles, too, have their place but we are rather shy about telling all about these sonic shapes.

The first research plane shown was the turboprop Handley Page 68 *Hermes* 5, the world's largest jet airliner at the moment. Power for this 40-70 seat transport is four Bristol Theseus of 2,220 h.p., plus 825-pound auxiliary thrust. There is no word now whether the *Hermes* 5 will be built as such for the RAF. Another transport research type flown is the *Mambathon* (Handley Page *Marathon* Mk. 2), now being tested with de Havilland braking props.

Only pure research design flown in the transport category was the Avro Type 706 *Ashton* Mk. 2. Power is four Nene turbojets. Other engine test beds included the Avro Type 694 *Lincoln* stripped of gun turrets and with piston Merlins replaced by the Bristol Proteus. The Proteus turboprop is destined for the *Brabazon* Mk. 2 and the *Constellation* replacement, the Bristol Type 175, ordered for BOAC.

Also in the research classification is the Armstrong-Siddeley *Snarler*, a small booster rocket engine using liquid oxygen and water-methanol and giving three minutes duration for 2,000-pound static thrust. Its weight is 215 pounds. The value of this type of power booster is open to argument, as is the excessively heavy fuel consumption of the afterburner technique. The de Havilland outfit showed what is called re-heat in the tail of the Ghost as fitted to the 112

☆☆☆☆☆☆☆☆☆☆☆☆☆☆

"May not our mechanicians . . . be ultimately forced to admit that aerial flight is one of that great class of problems with which man can never cope, and give up all attempts to grapple with it?" Simon Newcomb, *The Independence*, October 22, 1903.

* * *

"Nearly every aeronautic inventor has considered the feasibility of the helicopter principle, but to date no practical direct lift machine of this type has been constructed. Even the Wright Brothers devised a combination helicopter and airplane, while the famour French engineer, Louis Breguet, spent much time on this project." 'Will the Helicopter Become the Future Flying Machine?', Alvin Edward Moore, Popular Aviation, January, 1934.

☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Venom. The re-heat *Venom* emits a loud explosive noise just as it gathers speed for takeoff. No spectacular fuel-wasting flames can be observed and re-heat certainly pushes the *Venom* uphill at an impressive rate. Afterburning also is standard on the Vickers and Hawker interceptors of most recent vintage.

The Hawker P. 1702 is fitted with a *Snarler* unit. This plane was originally the test frame for the first Hawker jet fighter design, the P. 1040, now in production for the Royal Navy as the *Sea Hawk* Mk. 1. It has folding wings and arresting hook.

Missing from the research list were two single-seaters which would have attracted much attention. One, the Handley Page 88 was involved in a crash recently. The H.P. 88 was being used to test a new wing form, popularly known as the "crescent" wing. The other missing plane was the Fairey FD-1, a delta-wing of only 18 feet six inches span with 45-degree sweepback. This airplane has wing tip slats fitted just inboard of the anti-spin parachute containers on the tips. A tiny triangular tailplane is mounted on top of the wide area fin.

Although basic power of the FD-1 is the comparatively low thrust Rolls-Royce Derwent, it is augmented by a unspecified rocket motor. Wing area of the FD-1 is about 40 percent smaller than the other two research deltas, the P. 111 and the Type 707A and 707B.

The Boulton Paul P. 111, with 33-foot span and 26-foot length, has a Rolls-Royce Nene turbojet of 5,100 pounds thrust. Like the Avro 707, the P. 111 has a thick wing section, capable of housing the main undercarriage legs. Thick wing sections for high-speed flight look like the coming fashion once more. The FD-1, for example, has a fuselage undercarriage like the Lavochkin LA-17.

Most striking features of these delta wings is their capacity for high speed aerobatics and slow landing speeds despite the 45-degree wing angle. R. H. Smyth (P. 111) and R. J. Falk (707B) have been flight testing these deltas for almost a year. Smyth got the P. 111 off the deck in no time at all. Falk, with the larger and less power 707B, flew his delta across the airdrome in inverted position, rolled and climbed out of sight.

Slow-speed flight was demonstrated when Falk opened the top and bottom wing air brakes and cruised over the runway at about 90 m.p.h. at 100 feet altitude. He made two landings, the first with nose right up to take advantage of the wing area for braking, and a second time using the 8-foot parabrake.

Britain is in the ascendency when it comes to pure jet and turbojet transports. The de Havilland 106 *Comet*, shown but not flown, is the No. 5 and the first production model. Its new bogie undercarriage has 10 wheels. Next was the turboprop *Viscount* 1, fitted with 48 seats. These types are going to take the cream of the first-class air traffic for some time to come.

Next on the list was the Airspeed *Ambassador*, with 47 seats. Because of many delays, the piston-engine *Ambassador* is late getting on continental air routes. Other types destined for BEAC are the four-engined feeder liners, the de Havilland 114 *Heron* (14 to 17 seats), and the Handley Page *Marathon* (18 to 22 seats).

Smallest freighter of the lot shown is the new Auster (Model 4) ambulance plane which is powered by the Blackburn Cirrus Bombardier of 180 h.p. It is a slab sided four-seater with a rear loading door and trolley-type, four-wheel undercarriage. Military cousin of the Model 4 is Model S, also powered by the Bombardier.

The Bristol Type 173, a fore and aft twin-rotor helicopter housing 12-15 passengers has been test hopped but no specifications have been issued. Another 'copter seen at the show was the Bristol Type 171 Sycamore, a 4-seater, which faintly resembles the Russian Mil. The government airline BEAC is not interested in the Type 173, but looks to the 24-seaters and the more acceptable Fairey Rotodyne. It will carry 21 or more passengers. Only one commercial design in the amphibian class was displayed, the Short SA-6 Sealand, two or which have been delivered to Yugoslavia. END

THE MAIL BOX

ANOTHER ROCK ON THE ROAD

Hy Sheridan's little to-do on the "rocky road" in the September number was something worth not passing over lightly. In fact, with his probing sort of nose he could likely find evidence around Washington and elsewhere for some years past. The writer ran into these bumps while flying from an armchair in full repose and suddenly realized what could well happen if the lift were suddenly increased say ten times. Of course always having been an amateur scientist along the lines somewhat similar to your scientific reasoning and not able to run around with a diploma clutched high and waving in the air I ain't supposed to know anything. Of course, I raised myself on a diet of Tom Swift and Tom Edison—neither of which had a sheepskin proper engravured—so you never can tell what might happen.

Hy's sneaking suspicions to say nothing of his relating of the English and Yankee version of preventing an aircraft from falling apart at the seams was written in a classical manner no doubt causing bounce backs from almost all type of citizen no less the writer otherwise you shouldn't be reading these choice words. In my studied or shall we say my unsteady opinion the Limey version of what he calls the probe feeler would not be a bust up if certain things were considered which they evidently have not although I have not seen it I am going on what I believe can be done and what Hy relates in his own inimitable style of course. As to the American as he says way of using the bumps to de-bump the thing, I think more imagination could be used. Sometimes many engineering problems are so sticky that the boys sometimes get so close to the thing they are like the man so close to the tree that he couldn't see the forest or words to that effect.

GORDON JACKSON

Franklin, Penna.

CANADIAN JET STATUS

I would like to compliment you on the interest shown by you and your magazine in our Canadian Air Program which is only now gaining the momentum needed to bring Canada to the point where she can take her rightful place in the NATO set-up, as well as her place beside the United States, in the defense of North America against any possible aggression.

There have been changes made in that program since the date on which your article was written. First of all, the RCAF division which is to be equipped with *Sabres* and *Canucks* will not be in Europe as a team until around 1954. Not only do the planes for this force still have to be built, but the men who are to fly and service them, still have to be trained in their use.

Secondly, the Avro *Jetliner* which was one of the first jet transports to fly in the world will probably not be further developed until the present crisis has been cleared somewhat. That is of course unless some way is found whereby it can be manufactured without hindering the production program of the CF-100.

Also, it has recently been announced that Canadair will receive or has already received a contract to build considerable numbers of the famous Lockheed T-33 jet trainer, thus adding another star to the stable of Canadian-built jet aircraft.

JOHN WOODBURN
The Leader Post

Regina, Saskatchewan, Canada

SAAB'S IN ETHIOPIA

In your interesting report on Saab airplanes in service with the Royal Swedish Air Force (Europe's Third Best Air Force, July), you state that the Saab 17 single-engined dive-bombers were retired in

1947-8. This is true enough, so far as the Swedish Air Force is concerned. But it may interest your readers to know that 16 machines of this type are still in service with the Ethiopian Air Force. These airplanes were ferried from Sweden to Ethiopia by Swedish Air Force pilots in October and November of 1948. The operation was commanded by Count Von Rosen, a famous Swedish Airman, who is commander of the small but efficient Ethiopian Air Force. All the 16 Saabs were delivered without mishap—no mean feat considering the route hazards and distance covered. But returning to Sweden the 16 pilots and 10 other Swedish personnel were all killed when the Bristol *Wayfarer* "Flagship Ethiopia" crashed in Italy after motor failure—the worst accident in the whole history of Sweden's Air Force, as the official Swedish announcement described this tragedy.

DENNIS M. POWELL

Prestwick, Scotland

FIRST PARADISE FLIGHT

I read Don Browne's "Flying in Paradise" with great interest. Way back in 1940, when Ramey was known as Borinquen Field, nine other crew chiefs and myself (the old Headquarters Squadron 25th Bomb Group), formed the first flying club there. We each contributed $100 and bought ourselves a *Rearwin* in San Juan. We had a president and secretary-treasurer, as well as an instructor, very like what Ramey has today.

Flying in Puerto Rico was certainly a paradise and landing at El Dorado to visit with Miss Clara Livingston made us all feel right at home.

JAMES L. SHANNON

Chicago, Ill.

THE PLANES OF TEXAS

In reference to Mr. Hoadley's most able report on the Texas *Bullet*, FLYING, October, I was most interested in the ground speed attained against the wind on his flight from Stewart Field, Tyler, to Henderson, a distance of 34 miles in 10 minutes as stated in the article.

Upon reading this, I immediately whisked out the trusty Dalton Mark VII Computer, and to my amazement found the ground speed to be 204 m.p.h. Then the return flight in six minutes figured out 340 m.p.h.

This seemed slightly high, so after checking the sectional chart, I found the distance from Stewart to Rusk County Airport at Henderson to be 28 miles, thereby giving a ground speed of 168 m.p.h. to Henderson and 280 m.p.h. on the return flight.

This still seems a might high, but after all the *Bullet* is made in Texas, isn't it?

K. KEITH COCHRAN

Waco, Texas

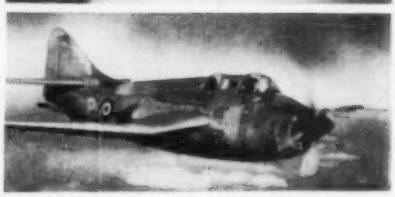
"FAIREY" CONFUSING

In your September issue's "Have You Seen" you pictured a British anti-submarine aircraft and described it as the "latest version of Fairey *Firefly's* three-seat anti-submarine aircraft with Rolls-Royce Griffon engine!"

If I am not badly mistaken, the aircraft is the Fairey *Gannet* 17, powered by Armstrong Siddeley Double Mamba. The aircraft is twin-engined with contra-rotating airscrews.

GEORGE R. BIEL

Pelham, N. Y.

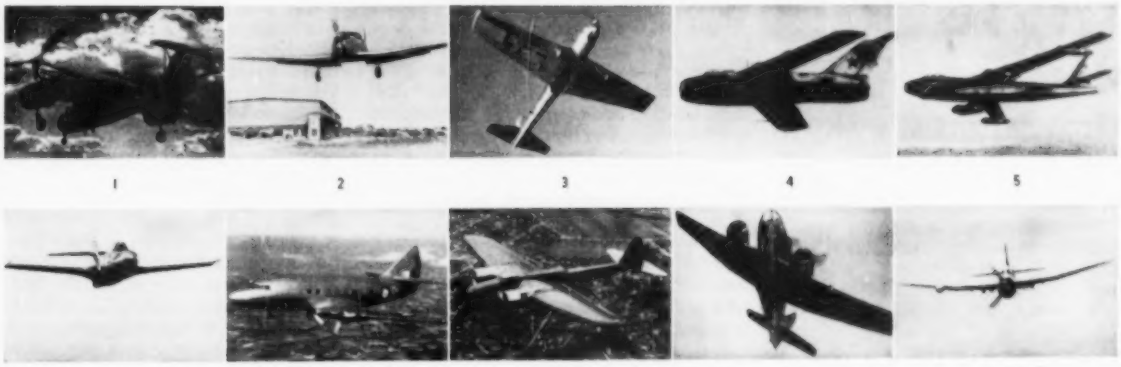


● *Mr. Biel is not mistaken (nor any of our other readers) who caught us in our mistake. The Fairey* Firefly *is at the top, the* Gannet *at the bottom. Our apologies to our sharp-eyed readers.*—ED.

RUGGED BUT WRONG

Your article "It's Rugged but Right" of the October issue was very interesting and should prove a boon in helping pilots of all grades with the CAA's program of promoting safety.

CAN YOU SPOT THEM?



1 2 3 4 5

6 7 8 9 10

(1) Vultee Helicopter (Russia). (2) Soko MB 138 (Czechoslovakia). (3) deHavilland Chipmunk (Canada). (4) Lavochkin La-17 (Russia). (5) Boeing B-47 (U.S.). (6) Grumman F9F-2 (U.S.). (7) A.W. 55 Apollo (Great Britain). (8) Aero 140 (France). (9) Fokker S-13 (Universal Trainer (Netherlands). (10) Consolidated TBY (U.S.).

However, I wish to point out an error in your answers, namely to questions 40 and 44. Your answer to 40 should read "False: An unsupercharged engine will gradually lose power as the altitude *increases.*" And 44, "True: a *leaner* mixture is necessary at lower altitudes due to the greater density of the air."

GEORGE A. SEIPP

San Antonio, Texas

● *We admit to the first correction, in which we erroneously said* decreases, *but Reader Seipp is wrong about answer 44. According to the question and answer book published by the CAA: "A richer mixture is necessary at lower altitudes due to the greater density of the air."*—ED.

'BYE TO BETTY

Why wasn't Betty Skelton's Notebook in the October issue? Don't ever let her miss again.

KURT RAMUNSCROFT

St. Louis, Mo.

● *Betty is operating a school for the Air Force in Florida and because of the demands made on her in this new assignment, she has had to forego all outside activities for the duration.*—ED.

FLYING RANCHERS

In reference to the Flying Farmers column, September issue, I would like to answer Homer Croy who says planes on farms are as useful as left-handed monkey wrenches. There are ranches in Wyoming whose acres must be vast and sprawled out because they are so arid. One cow needs ten to 15 acres in order to be able to thrive and live.

Before many of us had our planes, we planned to ride the North pasture on Monday, the West on Tuesday, the South on Wednesday and the East on Thursday. We would fix fences on Friday, go to town for supplies on Saturday and Sunday it was time to put the neighbors' cows out through the fence. We would sandwich all regular activities such as calving, lambing, shearing, branding, haying, ad infinitum, in between.

Because of the airplane, we can now inspect all our pastures on Monday, at the same time spotting the neighbors' stock. We visit all the sheep wagons to see what time the herders are getting off the bed grounds, return to the ranch and spend part of the week in town. We enjoy our Flying Farmers breakfasts on Sunday and for the first time actually get to visit the feed mills, bull and ram sales, pay social calls, hunt stray stock, check our reservoirs, find grazing grounds—all with the help of our plane.

We agree that the prices of planes are too high and operators with interest in the farms or ranches too few. But the basic utility is there, if it were only better demonstrated to the people.

MARY NICOLAYSON

Caspers, Wyo.

PLANE DESIGNATIONS

I have done quite a bit of traveling around to various Air Force bases but as yet I have not been able to find anyone who knows what the letter and number designations on AF planes designate. The variety of answers obtained from AF personnel is amazing. The markings to which I refer are the number on the vertical fin, usually running into five digits and which I assume is a serial number, and the two large letters and three digit number appearing on the side of the fuselage. In the latter group, I assume that the first letter stands for the type of its use and the numerals for a quick identification on airways, etc., but that second letter really has me stumped.

H. B. PETERSON

Washington, D. C.

● *Many of our readers have become confused by the new Air Force plane designations. For all those interested here is how it now works. The numbers on the vertical fin are, as Mr. Peterson rightly guessed, the serial number. The first letter stands for the type of plane; the second is for the manufacturer of the plane and the numbers following are either part of the name or depict modifications in the plane.*

USAF designations are as follows: B-Bomber; C-Cargo; F-Fighter; H-Helicopter; L-Liaison; Q-Target and Drone; R-Reconnaissance; S-Search and Rescue; T-Trainer; X-Special Research.

USNA designations are as follows: A-Attack; F-Fighter; P-Patrol; R-Transport; U-Utility; T-Trainer.

Manufacturers key letters are: B-Beech and Boeing; C-Curtiss Wright; D-Douglas; E-Piper; F-Grumman; H-McDonnell; J-North American; L-Bell Aircraft; M-Glenn L. Martin; N-Naval Aircraft Factory; O-Lockheed; P-Piasecki; Q-Fairchild; R-Ryan; S-Sikorsky; T-Northrop; U-Chance Vought; V-Lockheed; Y-Consolidated Vultee.

Therefore, i.e., the XF7U-3 Cutlass is an experimental fighter built by Chance Vought and is the third modification.—ED.

CHALLENGE TO THE CHAMP

Regarding the claim put forward by reader Charette in the September "Mail Box" and your remarks on same: I should like to point out that there exists in this country an auxiliary of the Royal Air Force known as the Royal Observers Corps. They are often referred to as "the eyes and ears of the RAF."

If Mr. Charette is so good, let him take a trip over here and have a smack at the Royal Observers Corps Master Recognition Test, which is compiled by the Air Ministry and consists of one hundred flying views of each aircraft on film, the maximum duration of each being three seconds. If friend Charette can get 90 per cent right, which is the passing mark, he had better come on over and join up.

K. S. WEST

Chief Observer, ROC

Bournemouth, Hants, England

Aircraft Costs

(Continued from page 16)

"heavy" bomber weighed 38,000 pounds. Today's B-47, classed only as a "medium," weighs in at 185,000 pounds. The Consolidated Vultee B-36 intercontinental plane, today's "heavy," weighs 352,000 pounds.

Thus airplane development today costs a lot more than in any of the yesterday. However, today's airplanes are much heavier and vastly improved over their predecessors.

The complete Norden bomb sight, used in World War II, operated very satisfactorily at relatively low altitudes. The price in production of 300 items was $8,000 apiece.

Compare this with a very small part of the tracking computer of the complex K-2 system, costing $50,000. The computer represents only a small part of the whole complex of electrical gadgets that make up an optical radar bombing navigational system of the modern heavy or medium bomber. The complete system costs $250,000 a copy for a single plane.

Unfortunately, we must go to this type of very complex and expensive equipment, for the mission of the modern aircraft is entirely different from the mission of World War II planes.

All of the very complicated devices are necessary for the accomplishment of today's mission, which involves flying at altitudes of eight, nine and 10 miles and at speeds that are approaching the speed of sound. Consequently, the problems of navigation and accuracy of bombing are entirely different from those in World War II. They are beyond the capacity of such a visual device as the original Norden bombsight.

A reconnaissance photograph recently taken from 45,000 feet showed every automobile on a street and two golfers on a golf course. With the use of a magnifying glass, the golf ball on the green was discernible. From 9 miles up!

Aeronautical research has improved and this, as much as the new-type planes, is what the dollars buy. And, in today's world it is a necessary part of the price of survival.

Just 138,000 engineering man-hours, for example, were included in the cost of the first experimental *Flying Fortress*. Today's B-47B *Stratojet* involves 3,464,000 engineering hours. In wind tunnels operation alone, the time has mounted from 248 hours for the entire B-17 series to 4,800 hours on the B-47 up to the end of June this year.

Research is many things. It is many engineers at drawing boards, at electric switches, at manometer panels, at the controls of mechanical brains. It is numerous branches of science. It is research facilities, staggering in their size and number, fantastic in their complexity—and a little bit of both in their cost.

Like the facilities themselves, the size and quality of the engineering stem from the complexity of today's planes and the new fields of science that have been tapped by aviation. For example, there is slightly more than 40 miles of electric wiring in the modern medium bomber. Naval patrol planes in 1939 had only nine electronic devices installed. Today they have 26.

To construct a modern jet bomber it is necessary to design and build more than 60,000 separate jigs and tools. One of them, the wing jig, requires the drilling of 15,000 bolt holes with tolerances of .0005 to .004 of an inch. Building that plane is a matter of putting together some 41,000 different kinds of parts, not including rivets and engine components.

While the price of beef and beans has been going up, here's what's been happening to the cost of equipment needed to build today's vastly improved planes:

These increased prices are due in part to increased wages for labor. For example, between 1939 and 1950 steel workers' wages increased 58 per cent, carpenters 70 per cent, and common laborers' 73 per cent. Aviation skills have had a like or greater increase.

Planing machines purchased in 1943 at a cost of $67,642 each, are being replaced with comparable machines costing $180,000 apiece. In 1942 a 51-foot spar mill cost $42,000. Today a 60-foot mill costs $100,000.

Air bolt lubricants in World War II were priced at 29 cents a gallon and they gradually declined until the pre-Korea price was 20 cents. But now the cost is up to 36 cents!

The air arms cannot operate without equipment other than aircraft and they buy a lot of trucks. The price pre-Korea of a 2½-ton truck was $3,970. The price now is $4,695. A pump driven by a gasoline engine, a standard piece of equipment for the Air Force, pre-Korea was $1,033. Today it is $1,764. That is a 70 per cent increase in price.

In World War II the Air Force was paying $4.10 a pair for shoes for its airmen and prior to the start of the Korean war in June of 1950 there had been no increase. But today the price stands at $7.25. Lumber during the last World War was $70 a thousand feet. It went up to $90 at the time of the Korean conflict and now it is $100.

All of you have heard a lot of jokes about the number of copies required of all letters and orders in the services. There's no question that it takes a lot of paper to satisfy that need. And there's been a price boost on that, too. Bond typing paper pre-Korea was 28 cents a ream. Now it is 34 cents. And the price of a steel desk for the so-called "chair corps" at the Pentagon and elsewhere throughout the world has increased from $59 to $159 since the start of the Korean conflict.

It should be remembered in reading over these costs that they are prices which Uncle Sam pays for vast quantity lots. But they give you some indication of what the armed services are up against on prices.

Of course, not every penny of the billions Congress appropriates for the military goes into the purchase of airplanes and supplies.

There is the pay and allowances of the men in uniform themselves. There are no figures on what it cost to train the test pilot I mentioned at the start of this article. The cost of his training, if it could be called training in today's meaning of the word, probably did not exceed four figures.

But today Uncle Sam invests $50,000 in the education and training of its rated flying officers! And we are investing more and more in the crews coming along as the aircraft themselves become more and more complex.

Progress in aviation, as in most things, can best be described as a series of steps, each pushing out from ground won by earlier steps. And as newer and newer thresholds are crossed, the costs of those steps will continue to mount as the machine becomes more intricate and requires longer and longer periods of time to design, build and test. END

Roles and Goals

(*Continued from page 15*)

cheapest form of bulk transport by cargo vessel, including during wartime when naval forces are needed for convoy duties. To build tens or hundreds of thousands of cargo airplanes and train tens of thousands of air crews to fly them would be uneconomical, to say the least, when a few hundred cargo ships with small crews could do the job of delivering supplies. If you gain command of the seas, and that means also the air above them where you wish to operate, you can go anywhere around the globe using whatever form of overseas transport that is most efficient and economical. Of course, critical material of whatever nature that can be air transported and that is needed in a hurry should go by air—as it is being delivered today by the Military Air Transport Service in its Pacific airlift, and in its continuing supply of overseas forces along its 95,000 miles of global air routes. To get there in time with critical material you need in a hurry—that is the job of the airplane, not the cargo steamer. Each has its appointed task; and each is efficient within its capabilities.

Q. Speaking of air transport, Admiral Duncan, naturally brings up a question about the present position of the Military Air Transport Service, a unified Air Force-Navy service, under the overall direction of the Air Force. We note that in addition to this unified global air transport service, the Navy also has its Fleet Logistics Air Wing, while the Air Force has its Combat Cargo Command. Do these other transport services duplicate the work of the Military Air Transport Service (MATS)?

A. The Military Air Transport Service is organized to operate on fixed routes and schedules. The Fleet Logistic Wings and Combat Cargo Units are organized to support mobile naval forces and combat forces in the field. Each transport service has a specialized field of its own. I wouldn't call this duplication.

Q. Could you tell us if Korean war experiences have given the U.S. Navy any reason to revise its opinion of the striking power of aircraft carriers, formed during World War II?

A. No. Mobility still is the chief factor. By the use of carriers you can get planes where you want to get them, anywhere around the globe where a ship can steam, without any dependence on land bases. You take your landing field with you, with your aircraft parked in it or on it. When you move, you move on your landing field. That is air power on a mobile base—a Navy specialty in the field of aviation, which itself is a highly specialized field.

Q. We note that the Navy is bringing many carriers out of mothballs into the active fleet. Does this signify any unusual emphasis on fleet aviation? We ask this question because it has been asserted by some that the fleet exists today chiefly to provide a landing field for naval aircraft.

A. There is no unusual emphasis on fleet aviation. We are expanding the fleet and are doing a comparable job in other elements. For instance, we have doubled the number of destroyers with the fleet, more than doubled the Marine Corps. Naval aviation has simply gone along with other things; it is an element of great importance as it was during World War II. This does not mean that other important elements of the fleet are being neglected.

Q. It has been estimated by land-based air power advocates that it will cost not less than one half billion dollars to build, outfit, and operate for the first year each super carrier. They assert that a like amount of tax money spent instead for land-based airpower actually would provide more defense value for the money expended. Is there justification for that assertion?

A. I would not agree. But I think that's a question like, "When did you stop beating your wife?" Anyone can prove anything with arithmetic. I do not consider that such figures have any validity unless the basis for computation is stated as well as many other factors. When you get into a war, you have to win it—or else. To win, you may need every last item you possibly can provide, including both bomber bases and aircraft carriers. These are not conflicting requirements. The base on land has the advantage of complete facilities for operating the largest bombers. It has the disadvantage of being fixed in position. The carrier mobile base you take along with you. You go to where the war has moved, taking everything with you. From that moving-war viewpoint, the carrier's advantage of mobility is important. But you can't launch a B-36 from it, and the Navy doesn't want to launch a naval version of the B-36, either. The Navy is very happy that the Strategic Air Command is in existence for the primary purpose of conducting strategic air warfare—and don't let anyone tell you

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differently. Each man and each force to his specialty—and integrate their efforts into a whole, an integrated power designed to achieve victory in possible war. Incidentally, I object to that term, "super carrier." It's a logical development of a proven weapon, and the successor of the MIDWAY class, our most modern carrier designed during World War II. We are taking advantage of experience and new developments in building today's latest carrier—just as airplane builders turn out types of aircraft more modern than those of five or ten years ago. Is there any reason why carrier development should be expected to stand still? I don't think so.

Q. Although only war can provide a conclusive answer to questions regarding the efficacy of any new weapon, such as guided missiles, supersonic speed aircraft, and bombs or rockets loaded with fissionable material, perhaps, Admiral Duncan, you can tell us how the Navy believes that it can operate against the threat of these new weapons in the hands of an enemy. For instance, in the event of war with Russia, does the Navy believe that it can retain command of the Pacific Ocean with its own means? Or will it require the support of American land-based air power operating from Japan and Pacific islands?

A. The Navy doesn't expect to fight any war alone, unassisted by the Army and the Air Force. We are not planning to run the Pacific end of a war only with the Navy. But the Pacific poses no great problem. Russian resources in their Pacific area are not large, and their ability to maintain and replace them is not good. Considered in relation to the 5,000-mile expanse of Russia, their Pacific forces are on the end of a very long rail and, presumably, air supply line. In a full-out war in the Pacific, what would *you* bet on as a supply line?—hundreds of cargo vessels, including oil tankers, or a double-track Trans-Siberian railroad?

Q. During World War II first the British alone and then the U. S. and Great Britain together maintained surface fleets in the Mediterranean, despite abortive efforts by the Italian Navy, and vigorous action by German submarines and land-based aircraft. Does the Navy believe that surface naval forces, using only their own carrier-based air power, can achieve and hold command of that narrow sea today? Or is integrated action planned with the Air Force operating from North African and southern European bases?

A. Let's say at once that if the Russians could bring their entire air power and other resources to bear on the Mediterranean Sea or any other single limited area, that area might well be untenable for unsupported forces, naval or otherwise. I believe we can operate in the Mediterranean against any opposition which the Russians can devote to that theatre. No power or combination of powers can devote its entire resources to one theatre in the kind of a war that will be fought in the future. Should war be forced upon us it will be waged by the joint efforts of the Army, Navy and Air Force forces, in combination with those of our allies. We certainly intend to operate in the Mediterranean and to make our presence felt there.

Q. Flying's editors have noted with concern frequent reports in the press of jet aircraft crashing on carrier decks. Can you tell us if the landing characteristics of high-speed jet aircraft are entirely suitable for carrier operations, and how naval aviators feel about it?

A. Jets are entirely suitable for carrier operations. In fact, the pilots themselves prefer jets because of their better visibility. There's no wide engine in front of them that they have to peer around; they can see the deck, right there below and in front of their eyes. In landing with reciprocating engines where the engine is out in front, many of the landings are to the left of center of the deck, because the pilot keeps his eyes glued on the landing officer, and does not at the same time have a full view of the deck. Jets, on the contrary, land smack along the center line of the deck because of the more perfect visibility. The tricycle landing gear poses no problem. As for the extra speed of jets, it is compensated for by better visibility. You have a faster landing plane, but at all times you can see exactly what you are doing with it, and where it is in relation to the deck on which you are landing. They say that some gentlemen prefer blondes, but all seem to prefer jets.

Q. Is the crash rate of jets operating from carriers any higher than that of propeller-driven aircraft?

A. There is no higher crash rate and we don't anticipate it.

Q. Are catapult launchings of jets achieved as quickly and as safely as catapult launching or fly-offs of propeller driven aircraft?

A. There is no essential difference. Any delay is a matter of mechanics, of getting the planes spotted. The size of the airplane and its weight has a lot to do with it. Naturally, modern jets are heavier to handle.

Q. Does the large fuel consumption and the high speed of jet aircraft add considerably to the operational problems of naval aircraft from carriers? In particular, will the high rate of fuel consumption add to the difficulties of repelling a shore-based airplane attack against the fleet?

A. It's a problem that will cause us to put greater fuel capacity in the carriers, and devise quicker and better means of getting the fuel aboard the carriers from tankers. It's a problem that we are taking care of. With jets the duration of flying is less. But with improvement of warning methods—which we are getting—we won't have to keep so many planes in the air. Jets have a much higher rate of climb, so it isn't necessary to keep so many of them up there. Difficulties are offset by advantages. So, what you may lose on the swings, you gain on the merry-go-round.

Q. Does the Navy's policy of aircraft procurement tend toward replacement of propeller-driven aircraft by jets?

A. We are getting a larger proportion of jets. But it is questionable if the prop aircraft will disappear for a number of years.

Q. Can you tell us the Navy's views about turbo-propeller aircraft?

A. We're interested. It has advantages for long-range aircraft. It has some application in attack aircraft, where high speed is not so essential.

Q. What is the present status of the flying boat?

A. The boat still has its uses as a long-range aircraft, and where you can't develop fields. It is used as a reconnaissance and rescue plane and is tender-based. I think that there always will be a field for flying boats.

Q. How do lighter-than-aircraft fit into modern sea warfare?

A. The semi-rigid fleet types—the blimps—have uses as anti-submarine patrols. Their observation capabilities are excellent, and they can remain in the air for a long time and make extended cruises away from their bases. Furthermore, they can refuel from aircraft carriers. Many have remained away from their base for a week or more. In connection with the development of sonar, the blimp has possibilities. However, it is not comparable with planes for attack, because it is slow and is a big target. A surfaced

submarine should be able to drive it off with anti-aircraft fire. Perhaps its greatest value lies in the fact that it can gain negative information over wide areas. It is also important for us to know where submarines are not operating—if nothing is there. That saves wasting the time of surface vessels in useless and expensive searches.

Q. The helicopter appears to have assumed many utility duties in the fleet today—notably as a plane guard. Is it possible that, in the future, large helicopters may provide the means of transporting Marine Corps invasion forces, supplanting landing craft?

A. The Marines are working on the use of helicopters in amphibious landings. But I think their value in that operation still remains to be proved. Their vulnerability precludes using nothing but helicopters. And in large division operations where enemy air opposition will be met I don't think the helicopter will develop into a completely satisfactory instrument. However, the helicopter has proved itself useful for special operations—notably rescue work on the battlefield and as a plane guard for carriers.

Q. In anti-submarine warfare, will this operation continue to be a special task force consisting mainly of carriers transporting aircraft of the hunter-killer type, with helicopters also added to the team?

A. That is only one aspect of anti-submarine warfare. It does not do away with the use of destroyers or shore-based air. However, it is one of the principal means of waging anti-submarine warfare: Hunt them down instead of waiting for them to come to you. I don't see the helicopter right now being a factor in attack. Helicopters are used for search and observation, rather than as submarine killers.

Q. We understand that some of the Navy's carriers are capable of handling aircraft large enough to deliver the atomic bomb. Are there any operating problems that will limit the size of carriers?

A. Yes, I think definitely there are limits to the size of carriers, as there are practical limits to the size of everything. Build anything big enough, and you reach the point of diminishing returns. Carriers will be limited in size by their draft, by the depth of harbors, by the docks they must occupy. Furthermore, they are limited in size by the number of planes that you can operate from one deck. You still land planes one at a time and that imposes some limitations on total numbers of planes. So, have two carrier units of reasonable, workable size, rather than a huge one. Extra big airplanes should be sent into the air from land bases or from the sea's surface—not from carriers.

Q. It has been suggested that there is duplication in research by the Air Force and the Navy, particularly in the fields of guided missiles and atomic weapons. If so, is this a waste of public funds, or is the policy healthy and productive of good results?

A. There isn't a policy of duplication in guided missiles and atomic weapons. In fact, in those fields there is more co-ordination of effort than there is almost anywhere else. There is an excellent exchange of views, and a carefully planned and integrated program of joint work. These plans are carefully scrutinized by all services to insure that there be no duplication of effort and consequent waste of time and of public funds. Of course, at the opening of the programs, there were so many new ideas that some got money spent on them and didn't work out. That was the experimental phase. But as the work progressed, the programs jelled. Today, as for some time past, there is full and complete co-ordination.

Q. Does each service keep the other continuously informed of its research findings?

A. Yes. It is a matter of continuous concern of the Research and Development Board. Each service knows at all times exactly what the other is doing.

Q. Naval Reserve aviation units appear to be unusually well trained. Just how does the Navy achieve this desirable result?

A. As you know, we have always had a deep interest in our Naval Reserves. After the war, we carefully selected our Reserve base areas to serve the greatest numbers of Reserves and keep them in training near their homes. We examined and screened the manpower we had educated during the war and offered them every possible inducement to take an active part and stay in training. Furthermore, we selected only outstanding officers to command our Reserve bases—officers who had made outstanding war records. I can tell you that officers considered it an honor to be selected to command Reserve air bases.

Q. Does the Navy provide its reserve units with modern aircraft—jets, for instance?

(*Continued on page 53*)

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100-Hour Check

(*Continued from page 33*)

mean a doggone thing. It's a cinch you can't hear 'em with all the other racket there is, and clearances even three and four times normal would never force a man down. That's the main reason we're running this check—to keep such a thing from happening. Bear in mind we're not primarily concerned with tuning up the engine. It was running OK when it came in. We just want to make sure it will continue to do so until we look at it next time. 'Preventive maintenance', they call it. All right—guess again."

"Spark plugs—I'd set the spark plug gaps."

"Now you disappoint me. The hell with the plugs. They can't force you down. One of them could cut out cold and you'd never know it unless you happened to check your mags. How many r.p.m. would you lose if all the plugs cut out—no two on the same cylinder?"

"Seventy-five to 100 r.p.m. Depends on the engine."

"Now you're getting the idea. So you can see you'd be better off to have a mag fall clear off the engine than have no carburetor heat when you need it, or the throttle arm drop off the carburetor just as you were taking off over those high lines south of the field.

"When I start a check, in the back of my mind I have the idea of finding something, in fact everything, that could force the pilot down, *and of finding it as quickly as possible*. The sooner I locate it the less time the ship will be laid up, and you know they don't make any money for you sitting on the ground. The sooner I find something broken, the sooner I can put another man on it, or order a new part, or notify the customer so he can grab the airline. Or say the owner has a red hot charter trip to Caliente or someplace and he's breathing down your neck while you're completing the inspection, and just before you button it up you find a cracked engine mount. Somebody's going to be awful unhappy."

"So the first thing you check is the engine mount!"

"No, but you're getting warmer, Johnny." Pulling a small notebook from the pocket of his coveralls, he made a notation and said, "Does this mean anything to you?"

Johnny read, "Dorothy LaRue, Templebar 6800. Boy, I'll say it does! How is she?"

"Not that, laddie, over here," and he underlined *installation*. "Now that covers a lot of territory and the first thing is the *cowling*. Inspect it as you take it off: loose Dzuses, cracks, signs of oil or exhaust leaks, spare parts lying in the bottom that might have shaken off somewhere. If it is coming apart, someone else could be fixing it while you go ahead with the check. If you don't look at it till last, sometimes you're going to get stuck. Pay particular attention to whatever holds it on the airplane, 'cause there's where you could get a forced landing. I've seen a windshield smashed on a Beechcraft on account of one fastener that failed and the speed ring on a Reliant move forward into the prop more than once.

"Check the *baffles*. Elementary, but of extreme importance. Stuck rings, burned valves, even piston failure have been traced to poor fitting baffles.

"Don't just look at the *oil lines, tank, and radiator:* Tug on them to see if they're about to pop off, or if by shaking them you can make them rub on something as they would under vibration. Be on the lookout for signs of fresh oil. Whipped around by the airstream it goes every which way—even up. Remember to look for the leak on run up after you've washed her down.

"*Exhaust manifolds* and *heater muffs*—we take these things too much for granted. They've been making stacks for a long time now and they still haven't got one that hasn't cracked at some time or other. There's a late model four-place job hanging in a tree up near Alturas that should have had more time spent on its stacks and less on its valves and plugs. The coroner said there was enough CO in the pilot and his passenger to kill four men.

"*Fuel lines:* Feel them, shake them, move them around, with the fuel valve on and pressure up. Don't overlook the primer lines, and beware of rubber grommets in the firewall. Darn things are treacherous. The stainless steel will cut right through the rubber and on into the line, and it will still look okay from the outside. First thing I would do on my own ship is throw them all away and put in micarta bushings and my worries are over.

"*Engine controls:* Throttle, mixture, carburetor heat—you don't have to have much of an imagination to visualize trouble from any one of these babies, if it should occur at just the wrong moment. Security of connections is not the only point. Operate them, or better yet have someone else operate them, while you watch what takes place up in front. I've seen mixture controls move into full lean and stick in that position. Any number of times I've found the carburetor heat control ready to fall off in your lap. It gets the most use and is built the lightest. When I repair the control arms I try to provide a lot more bearing surface, at the bowden wire connection. I generally discard any connecting device that will crimp or cut the music wire and replace it with a standard AN bolt, passing the hard wire thru the cotter key hole and clamping it between a plain nut on the inside and a castle nut on the outside, which is locked with safety wire.

"Now look over the engine itself: missing nuts, broken studs, cracks in the case between the barrels and around the carburetor boss. If an oil leak shows a part working loose try a wrench on the mounting studs and if they're loose, take them up—but evenly. Never get the easy ones in front and let the tough ones go. Better you'd left it alone entirely, for now all the load will fall on the studs you've tightened and you're just asking for real trouble later on, like a cylinder sailing off thru the cowling.

"It's a good idea to feel the intake manifold nuts with a wrench, for there's no oil there to show a leak. See if you can get any sway out of the carburetor or adapter. Some engines show a marked tendency to get rid of their carburetors. That takes care of the *installation*.

"*Engine oil system*—Why do we get it now? Well there's no use going ahead with a check if the oil screen is full of your master rod bearing. You see a lot of monkeys pull the screen and let the whole works fall into a pail of solvent without so much as a glance. Boy, that's the one thing that really tells you what's going on in your engine. Take it out in the sunlight and look at it closely. A couple of shiny particles need cause no alarm, especially in a new engine. Don't worry, if something is really chewing up inside, there'll be enough junk in the screen to leave no doubt in your mind. On some engines the screen is well hidden. On the LeBlond you have to pull off all the lines and the pump, and on the Franklin it means dropping the pan. But you wouldn't okay a wing if you hadn't looked inside. Is the engine less important?

"Examine the sump plugs for the same evidence. A piece of a ring or a pin retainer would show up there rather than in the screen. Never start a drain plug, just to keep the oil from dripping on you, intending to tighten it later. If you leave it out completely it's not so bad; you'll see it when you put in the new oil, and if you forget to do that you're still safe. You'll never get off the ground. But if it's in just finger-tight, the next thing you hear about it will be right over the first mountain ridge. When you start it, tighten it up and make it safe, before you

★ A FLYING TIP ★

COMING out of the bright sunlight into a dimly lit theatre, who has not suffered the embarrassment of attempting to take a seat already occupied by another?

A takeoff at night, immediately after leaving a brightly lit airport office, can prove to be even more awkward. It takes at least thirty minutes for the eyes to become adapted to the dark, and this acquired sensitivity can be destroyed immediately by any flash of light. Avoid a last minute cigarette and if it is necessary to examine maps or instruments, do so by the dimmest light possible—preferably red, to which the retina, like camera film, is the least sensitive.

Whatever you wish to see most clearly, do not look at directly, for it is the outer edge of the eye's sensitive membrane that picks up and transmits to your brain obstructions on a poorly illuminated field, or trees, poles and fences near your glide path on a dragged-in low approach.

—*Ralph Korngold*

think of another thing.

"With all the oil smeared around this would be a good time to wash her down. You've looked at the installation before any evidence was destroyed. Now you may as well improve your working conditions by having everything clean. It has to be done eventually, that's for sure. That's what the customer sees. You can give him the best check in the world and it won't mean a thing to him if there's dirt on the cowling where he has to look at it all the way home and grease on his new seat covers!

"Keep the spray off the mags. But if you do get a little bit in you'll find it when you check the points later. That brings us to *compression* which you check after one set of plugs is removed.

Just shove your thumb in the hole and bring the piston up to T.D.C. firing stroke. If when you pull out your thumb you get a good healthy 'pop,' you know that jug is okay. Nothing there? Then it's valves or rings. Squirt in a little oil and try it again. The oil will seal the rings temporarily and if there's still nothing there, it's a valve. After you've gone around a couple of times you'll have a good idea of the cylinders' condition, and that's all the best gauge on the market can tell you.

"Naturally, you don't go pulling off barrels without due consideration. Maybe you need her for one more trip and it wouldn't be dangerous, but a leaky valve will never get better and the repair job will get more expensive the longer you let it go. By a simple valve grind now, you can save the price of a new valve later on, or even a valve seat replacement.

"Now comes your *valve check*, Johnny! But even now the primary purpose in taking off the valve covers is not to reset the clearances but to make a visual inspection. Your little job has hydraulic lifters which take all the lash out of the valve train. The initial clearance is built right into the engine and there's nothing for you to reset. Sure the bigger jobs like the BT have adjustable rocker arms, but they also have fuel pressure feed to the rocker boxes and the clearances won't change appreciably, once they are properly set after overhaul. But even if they did, and were operating at three or four times normal, it would never force you down. I doubt if you'd even know it, unless you have a manifold pressure gauge and were familiar with its optimum reading.

"Why I was running a check on a 90 Le Blond one time and I'm a sonovagun if I didn't find the ball ends broken completely off the push rods on No. 1 cylinder. Yet the only symptom was a miss at idling speed."

"That sounds like the well-known crock to me!"

"Johnny, it's a fact, so help me. At 2,000 r.p.m. how long does a valve stay open anyway? Apparently the push rods were just flying up and down in their housings like projectiles, knocking the valves open just enough to do the job.

"Just be sure everything is 'normal.' No rocker arm bearings going out; no plugged oil passages. Should you ever have to reset the clearances, like on a Lycoming job, before you replace the covers go over the lock nuts once more in succession, with undivided attention. If you leave one of them loose—and it's easy to do in the confusion of handling a screw driver, a wrench and a feeler gauge and turning the prop in the meantime—you've done more harm than good.

"Install new cover gaskets if possible. They don't cost half as much as the man hours spent in removing the cowling and replacing the leaky one later on.

"Now number four on our list is the *fuel system* which we check all the way back to the tanks. Drain the fuel strainer, and unless it's glass, disassemble, check the screen, reinstall and safety. It's a good idea to drain the float chamber. I don't know how all that stuff gets by the strainers, but when you pull a carburetor down that hasn't been drained regularly, there it is and plenty of it.

"Check the fuel selector on a ship that's unfamiliar to you. Occasionally, some meatball gets the handle on wrong and it points to a tank you expect to use when it's actually in the off position. Drain your tank sump and resafety and check the cap to be sure the vent is open. The parts of some caps can shift relative to each other, closing off the vent hole, and sometimes a radiator cap is substituted which has not been drilled for venting. This may not show up with a full tank, but if you are depending on the use of *all* your fuel, it will certainly force you down.

"*Ignition system* is least liable to cause a forced landing on account of the duplicate systems. It depends on the make of course, but some mags are better off left alone. Certain airlines have even sealed them up and never touch them between overhauls. Other mags require more frequent servicing, even to the renewing of points every couple of hundred hours. You don't have to be concerned about the Bendix mags on your mill. Unless I know the ship, I always take a look at them anyway. Check the points for proper gap, with no excessive oil or solvent in the breaker housing. Be sure they're clean by folding a piece of pinked tape over a feeler gauge, dipping it in carbon tet. and passing it between the points. Careful not to open them too wide or you may damage the spring. Put a touch of non-fluid oil or other high melting point grease on the cam to prevent wear of the fiber rubbing block. Check the rotor and distributor leads for looseness and signs of arcing. The wires require no attention other than to make sure they are not loose in the distributor or lying across the exhaust manifold somewhere. On shielded plugs, the 'cigarettes' should be clean and above all, dry.

"Now about those plugs that everyone's so worried about. You can spend a lot of time setting the gaps just so, but how

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LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

ACCIDENT REPORT

The airline pilot was explaining his accident, explaining verbally. The managements now catch 'em quick and put 'em on a magnetic wire recorder. Thus, they get the pilot before he has had time to put his recollections in order, and if he says anything they don't like they can erase it. The managers sat around with encouraging smiles on their faces and at first the pilot did not know where he had seen such expressions before, and then he remembered: At a cock fight.

"It was this way," the pilot began. "We were sailing along when all at once the copilot looked back over his shoulder and cried out that No. 3 engine had been afire and was about to drop off. Well, we feathered number one engine. Right away we thought that it would be a good idea to put out the fire so we reached down and pulled the extinguisher lever except that it turned out to be the dump lever for the gasoline. We had put on the Sperry Pilot so that we would be free to handle all of the valves and things. We had set the Sperry to go downhill and we were getting close to the emergency airport when we asked the tower for the runway and he gave us 13 which I transposed into 31 in my mind. I then reached down and disconnected the Sperry Pilot except that I got hold of the idle cut-off levers and that stopped all of the engines. We put the landing gear down and just a little way out we put full flaps down, but without any power and that was too much and we weren't going to get over the the fence, so we pulled up the flaps except that it was the landing gear. At that point we got confused. And that is how the accident happened."

• • •

ARID, TO BE SURE

It's been getting more and more dry in Arizona. One of their pilots flew to Los Angeles and while sitting in an ego repair shop called the Spiked Angel, he told his listeners, "Yes sir, it sure has gotten dry out there in Arizona. When the gals cry they don't use handkerchiefs. They just dust their faces off with a whiskbroom."

• • •

SUDDEN THOUGHT

The only problem that bothers the co-pilot is how in the world the captain got by during the years before he had a co-pilot.

• • •

"Well," said Sadie, "the B-47 ought to have clean looking lines. It has swept wings."

• • •

ACES, HY?

It's a funny thing, but if a man gambles with cupid he is likely to lose if he holds a good hand.

RAISING HURRICANE

The hurricane is the kind of wind that lives up to its name. The wind is in a hurry and it usually raises cane. It is not very dangerous to an airplane, though.

The reason that the hurricane raises so much hob on the ground is that the houses and things like that are not designed to go with it, and the people are reluctant to. I have been dawdled with by both hurricanes and thunderstorms, and of the two give me the hurricane every time. The hurricane itself does not have up and down drafts. The wind is blowing horizontally for the most part and without gustiness except near the ground where the terrain effect may be felt; then you can experience rapids.

The main danger to a stout airplane is the rain. At some sectors in a full-grown hurricane it may rain very hard. The heavy rain causes strong down drafts, and will fill your carburetor with water like a fire hose. The sheer weight of water on your wings may push you into the ground.

How heavily it rains cannot be appreciated until it is experienced. It is said that a submarine was caught in a hurricane off the Coast of Florida in 1938 and in order to escape the jouncing of the seas, the commander took her down. The rain was so heavy that the navigator became confused and when they made port the next day the scuppers (whatever those are) were filled with cocoanuts.

It does not rain that hard all over the hurricane, however, and so it is wise to fly where there is no hurricane.

Airlines, however, are getting some experience with hurricanes. Recently, we had a dandy at Tampico and one of the pilots who had to go through the western part of it was asked to radio back any information that he might be able to give. "What did you do?" he asked.

"Oh," he said, "I just gave 'em a blow by blow description."

• • •

MEMORIES, MEMORIES

Do you remember when we all used to wear caps and we would sit down on the airplane—there was no fuselages—and turn the bill of the cap to the rear and we were all dressed for the ascension?

• • •

OVERHEARD IN THE LOUNGE

"On this route," a passenger asked, "do we fly at a fixed altitude?"

"Oh, no," Sadie replied, "there's been nothing wrong with any of our altitudes."

• • •

EPITAPH

The lad who lies within this casket
Had a question but didn't ask it.

long do they stay that way? I don't advocate neglecting them by any means but there are other things of greater importance. Out of curiosity, I've measured the gaps on some where it looked like you could throw a wrench between the electrodes. They were over .060 and working perfectly—checked out at 120 pounds. If you have to put in any new ones, look at the gap and check the plug in the tester before installing in the engine. Brand new ones are occasionally stone cold dead. Never use a plug that has hit the deck."

"Huh?"

"Dropped. It may be damaged where you can't see it, and fail later on. It's a good trick to count your gaskets after removing the plugs and before putting them back in. Use graphite base anti-seize, but be careful not to spread it around as it conducts electricity. While mica base anti-seize is a very poor conductor it is no better as an anti-seize. Safe, but worthless, from my experience. Install the lead as soon as you've tightened the plug. Never place a lead on a plug you do not know is tight.

"Well, we're all done but the run up which should be done with the cowling off. Over at the air base I see them checking out the big jobs with the cowling on. Maybe they have to, to get adequate cooling. But anything we work on runs cooler with the cowling off. Besides you can spot things with the engine running you'd never notice otherwise: oil and fuel leaks, loose accessories, excessive vibration in lines not adequately supported, or tools you may have left on the engine.

"Of course no check is complete without a glance at the *propeller*. See if it's picked up any big rocks lately, and smooth out the nicks with a small half-round file and progressively finer grades of emery until it has it's original finish. If the prop is wood, check for loose rivets in the tipping and try a wrench on the hub bolts, especially in hot weather. Amazing how much they can loosen up. Observe the track with the engine idling and be sure the spinner is in good shape.

"Well, Johnny, that's about it. I'll check with you from time to time, and before you cowl it up. The regulations say your work must be under the direct supervision of a licensed mechanic."

"I'll sure appreciate it, but how will the company feel about me doing my own work?"

"As long as it doesn't interfere with ours I'm sure there will be no squawks. We've got so much work in the shop anyway we're going to have to put on more men, or the ones we've got will have to start working—one of the two. If you want to stay popular with the boys in the shop take it easy on borrowing stuff. A man can't work without his tools. And if you've got something of his when he needs it, he might as well go sit on his hands for all the good he does till you bring it back or he finds it. You can buy yourself all the tools you'll need with the dough you'll save on one check. Make a list as you go along, and get them as you feel the need. It will make working on your ship a lot more fun if you have some iron of your own!" END

Sneak Flying

(Continued from page 21)

weather.

To those pilots who use their planes for pleasure and fair weather flying, this article is of no particular value. However, to those who use aircraft for its major function of rapid transportation, this article might contain an idea which could save your life. The ideas herein are the result of experiences of the author and other pilots with whom he associates. Let us all remember that no matter how much experience you have, it is important to keep on learning at all times, or the one point you may have missed might some day catch up with you. Also, remember that Civil Air Regulations are intended as a safety measure, not as a bunch of rules enacted by a group of armchair pilots.

Let's face it—if you fly for business you must break the rules occasionally. You don't want to be weathered in for days at a time and thus lose all the advantages of your plane. This is the basic reason so many pilots stick their necks out beyond their good sense and judgment. In all probability, nearly every pilot who has flown into a hill or tree had scoffed at similar accidents as stupid or foolish, but yet did it himself.

No light private aircraft, in my opinion, is capable of a safe instrument flight through any weather except a climb-out or descent through thin stratus. The radio equipment necessary for safe instrument flying is costly and heavy, and must be supplemented by duplicate units in case of failure of the one. The reserve horsepower necessary to overcome the weight and drag effect of ice, the steady pull of down drafts and the high altitude sometimes necessary is too limited in most private planes. The weight and cost of necessary de-icing equipment is prohibitive. But if you have a ship with all the necessary equipment, keep yourself mighty sharp on your instrument flying technique because you can get rusty mighty fast, and this you can't afford to do.

Now, what's left when the weather is down and you have got to get to the next stop to close a sale? "Sneak flying" is all that is left. Sneak flying is the type of flying beneath the weather when the distance from the ground to the base of the clouds is low enough to present a problem.

Sure, you break regulations. It's done every day. If it wasn't those news items wouldn't be there. The CAA and all concerned know that these regulations are broken. These winter accidents can leave no doubt in their minds. Let's use some sense about this type of flying. Let's have a definite plan and absolute limits on how far you are going to sneak fly and when you are going to turn back.

If you are over country you know the problem is relatively simple. However, my friends were killed over known country, because they didn't know just when to stop getting lower or when to make that famous 180° turn. If you are sneaking under an overcast that appears to be lowering and causing you to lower your altitude, have a definite absolute minimum altitude at which you will go no lower. This altitude should be sufficient to positively clear all obstructions in your vicinity, allowing for some error. If you are not positive of your position, raise that altitude sufficiently. If unable to get through, never fly below that altitude but go back or proceed to an alternate field.

Never get into a position where you are unable to turn around. Constantly keep this in mind when approaching hilltops, valleys or other obstructions. Again, I repeat, have your own altitude, whether it is 200, 300 or 700 feet. Never go below your own minimum altitude for even an instant.

Unfamiliar terrain presents a more difficult problem and your minimum altitudes should be progressively higher. Consult maps for obstructions, passes, power lines, etc., for several miles on both sides of your proposed course. Check with local pilots on any new obstructions which might be a hazard and are not located on the maps. Keep those minimums considerably higher and keep your alternate plan of action in mind at all times while sneak flying in unfamiliar terrain.

Of course, each different type of terrain presents its own different problem. Mountains and hills kill more than flat country, naturally. When you attempt to fly up a pass that is overcast, never go past a point where the canyon is so narrow that a safe shallow turn cannot be executed. Never proceed if the visibility is such that you cannot see past the turning range of your ship. Never fly directly across a ridge at right angles—always cut across at approximately 45° angle so in case of engine failure or down-drafts a turn back could safely be accomplished. Never cross a pass close to the ground at low air speed or when there are strong winds. Be especially watchful when crossing into the wind. Never enter clouds above a ridge planning on letting down on the other side—this little trick traps many. If you are not absolutely certain of your position over mountains, raise your minimums. Be extremely cautious to avoid entering a box or closed canyon.

On the course from Ashland, Ore., to Montague, Calif., there is a peak jutting above the rest. To the pilots who fly this country it is known as "Pilot Rock." It is a great honor to have a mountain named after you. This honor is achieved either by discovering an unknown mountain or, the dubious honor, of flying into one. The pilot that gave a name to the hitherto unnamed peak was flying an AT-6 to Medford, Ore. He followed the highway from the Klamath River but the pass at Siskiyou Summit was closed. He flew east along the crest of the ridge until he spotted a small break in the clouds and the valley on the other side. All was dandy, except the strong North wind flowing over the ridge. As he entered the hole he started down with the strong draft. He applied full power, but crashed a few feet from the top. There are many ridges, passes, and peaks throughout the

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Since these accidents are a result of weather it is very important to check the weather. Talk your flight over with either a CAA representative or airlines forecaster. Let him know you intend to fly contact. Listen to his advice. If no meteorologist is available, check the weather a few sequences back and try and determine whether the trend of your weather is rising or falling. Trend is indicated by wind, barometer, ceilings and visibility. Rain and low visibility are an equal hazard with low ceilings. Remember that ceilings and visibilities may be reported erroneously. Also, rain on a windshield reduces the visibility lower than a person on the ground would report it.

Know your ship and its maneuverability. Never go beyond the point where you cannot turn inside of the area of your vision. Watch the weather at your alternates as closely as the station of your intended landing. Never go below your own minimum altitudes in the hope that the weather will improve a mile or so on the other side of the cloud that is trying to force you down.

Most of us who have been flying for a considerable time get lazy and either fail to plan a flight completely or just plan the barest of essentials. Flight planning is important. It is especially important in marginal weather. Any one with a ticket can figure your course and check the terrain features and weather conditions. Do you do it though?

If you intend to follow a highway, railroad or similar check points, check the map for sucker traps, i.e., similar railroads, highways, etc. I wonder how many pilots have been killed flying up a valley or pass that they thought they knew but actually was a similar one not far away?

Though those of you who use planes for transportation, rather than training or pleasure, you should practice, whenever possible, to maintain a high degree of ability. It is not too much trouble nor too time consuming to shoot a practice low visibility approach at a field. Try and practice short type patterns and short field landings when the weather is good. Some day it will pay off in high dividends. When flying good weather, fly it as though it were marginal weather and establish your minimums; and really learn the country. If you have a few basic instruments, practice their use whenever practicable.

Now that we have covered these few simple but important rules for self-preservation, if you keep a step ahead of the weather, keep out of clouds and don't fly dangerously low, you should have no trouble. Suppose you do, by accident, get trapped on top of a cloud formation or you plan a flight over what was supposedly a local fog or stratus condition, but find that the stratus has spread out and closed in your field of intended landing? If you have studied and watched the weather you know in what direction any major breaks or clear spots might exist.

If you have a radio you are not too badly off. Weather reports and airways assistance will be granted you readily and possibly even GCA will be available. GCA and Army radar stations are becoming quite numerous throughout the U. S. Learn ahead of time their various locations. Use any and all facilities possible even though you might get called on the carpet for being where you are. Remember that your position is that of an emergency and that all aids will readily come to your assistance.

If you are unable to find any breaks and no such facilities are available, you should dead reckon to the vicinity of the nearest large airport that is equipped for instrument flying. If you are lucky and spot an airliner or any other instrument ship, rock your wings. Many a private pilot has been herded down through, or shown a hole in the overcast by an airliner.

One such incident happened one night last summer over Crescent City, Calif. Capt. Jack Gladney was flying a Southwest Airways DC-3 from Eureka to Crescent City on top of fog. By the mouth of the Klamath River, he noticed the navigation lights of another ship circling where the edge of the fog ran up against the hills. He proceeded on over the Crescent City homing beacon and started an instrument approach. During the approach he was radioed by the airport manager asking if he had seen a missing *Ercoupe*.

It seemed that the pilot of the *Ercoupe* had taken off an hour previously for Eureka and the weather there was 200 feet and half a mile. Gladney then understood the predicament of the ship he had seen circling on top, so he pulled up and started back.

He found the *Ercoupe* still trying to find an opening to get under the fog. He turned on all lights and slowed down. The *Ercoupe* sidled up like a chick to a hen. Gladney flew up to a small hole he had seen during his approach and circled steeply. The *Ercoupe* peeled off and landed safely at Crescent City.

If you have a few basic instruments in your ship, but are unfamiliar with their use, dead reckon for flat country or water. Very few ceilings other than ground fog ever come much closer than 100 or 200 feet. When you let down through the cloud deck over flat country, let down at minimum maneuverable air speed and at about 500 feet per minute descent. Descend straight ahead—don't attempt turns. You will probably break out. But if you should hit, the slow speed and the rate of descent would probably not injure you. Keep your head and keep that air speed under control.

I feel at this time I should mention a friend who had just received his instrument rating, stacking up. Ed Welsh was a successful oil company engineer with a good future. He had a converted L-5, which he kept in perfect condition. He was a safe pilot and I even let him fly my children around on Sundays. He got an instrument rating so as to better fly the summer fog that exists around the San Francisco bay area.

One Friday, he took a short trip to Clear Lake, where no CAA facilities exist. On Sunday afternoon, it was overcast at Clear Lake but clear at San Francisco. Welsh took off and started to climb up through the stuff. The clouds weren't stratus, but cumulus, with moderate turbulance. He spun out two minutes after entering the overcast.

His was a case of a little experience being worse than none at all. Unless you have had good instrument training, some actual experience and constant practice, I do not believe that instruments will help you at all. Rather than that, I think they would tend to give you a false sense of security and lead you into a very bad situation.

A plan, an alternate plan and your own minimums are the only true insurance you have in marginal weather. Don't ever be too proud to ride an airline, or train, or bus when it makes good sense. Let's let the mountain climbers name the mountains. END

Roles and Goals

(Continued from page 47)

A. Yes. The program calls for modernization with jets. Some squadrons have them and will have more when they are available.

Q. Are reserve pilots and air crewmen given fleet training during a calendar year?

A. We give them as much as we can. We do have a program where they can spend a couple of weeks aboard a carrier. Admiral Reeves, down in Pensacola, until he retired, did a lot on that program, as you know from your trip on the carrier WRIGHT. Of course, we haven't always had the facilities to do what we wanted to do for the Reserves. But with what we had, we did the best we could.

Q. It is well known that our soldiers in Korea had high praise for the close support afforded them by Marine Corps pilots. Could this type of close support be provided for larger units of infantrymen, up to armies?

A. It could, and I think will be given. You know, there has been a lot of ill-informed discussion on that point. The Marines worked for years developing air tactics to support Marine ground forces. That was their specialty, so there was no reason why they shouldn't become good at it. Pilots trained as our Marine pilots were trained could support ground forces of any size, up to Armies. Of course, there are some differences of opinion on the basic concept about how to run the operation—how to control it. These matters are under study and will be worked out. The Marines mastered the techniques to make it effective, particularly in connection with amphibious operations. And when you find something that *works*—well, you have something that *works*, that isn't a matter of theory. It has been tested in war. You must of course distinguish between close support of ground troops which is conducted in close proximity to the forces on the ground, and tactical supporting air operations which may be conducted at some distance from the front lines. The Marines have made a specialty of the former and have worked at it and worked hard. That is why they are good.

Q. Can you inform us if at present Marine Corps pilots flying in close support of infantry are under the direct control of ground commanders? If so, does that interfere with the purely air part of the task—achieving and maintaining local command of that ground operation?

A. The ground commander makes the decision about what he wants done to help his troops. We figure that they're the ones who are being shot at, so what can the air do to help them? The ground commander tells us, and our Marine pilots do it. It's as simple as that. As to the purely air part of the task, if an aircraft can't remain alive and fighting in the air, it can't do anything for anyone on the ground—so the Marine pilot is given the training necessary to enable him to stay alive, and fight. He seems to have accomplished that in the last war and also in Korea. Of course, as to control, we carry that to a smaller unit than the Air Force does. Maybe we can learn from them, and they from us. What both the Navy and the Air Force are looking for is a system of control that will give to the ground forces the most effective support. That is being worked on—and I think it's pretty good right now, on both sides.

Q. Does Korean experience offer conclusive evidence that the Navy will be able to direct carrier-borne aviation into enemy-controlled air space and recover it without unacceptable losses? For instance, in Western Europe in the event of a Red Army invasion?

A. Moving in and wresting control of the air from the enemy is included in our plans. We expect to achieve it in the areas in which we operate.

Q. We presume that fleets within range of an enemy shore will be logical targets for shore-launched guided missiles. Is it sound to assume that shore positions—such as submarine bases, for example—also will be logical targets for ship-launched guided missiles? Or are ground targets allotted only to the Air Force?

A. There has been no allocation of targets. None of them are patented or copyrighted, with exclusive rights given to anybody. We expect to attack appropriate shore objectives with naval air and guided missiles, taking advantage of having a mobile force. We move where the war moves; we will attack where attack is needed. The Navy is a fighting force. It is not a defensive force. We haven't built that kind of a Navy. We believe in carrying the offensive to the enemy, and maintaining it.

Q. Recently Admiral Fechteler, Chief of Naval Operations, stated that he saw no possibility of invasion of the country as long as we have control of the sea. Is not an aerial invasion of Alaska quite possible?

A. I think that is a possibility we have to be prepared to face. We have to provide against surprise attack anywhere. So far as one may provide against the uncertainties of war, we have provided. An enemy, collecting superior forces for quick deployment against a selected objective, might achieve an initial success. We must be prepared to prevent him from exploiting it and to dislodge him.

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Q. In the event of a surprise invasion of Alaska by air, does the Navy believe that it could bring enough air power to bear on Russian occupation forces to dislodge them?

A. Naval plans provide that major tasks are performed jointly. If Alaska is invaded, say by an air invasion, the immediate task will be to get those unwelcome visitors out. The Navy will put in its contribution, have no doubt of that. The Navy's sea and Naval Air forces will be part of the effort put forth by all elements in our national defense. The Navy has no plans to fight the war alone. It's an integrated part of a defense team.

Q. If the Russians could invade and occupy certain Greenland and Iceland air bases of ours, do you think that the Navy could cut off supplies by sea and air to those bases? In other words, Admiral Duncan, does the Navy believe that it can maintain control of the Arctic seas and the air space above them?

A. We would expect to prevent them from doing it in the first place. However, we feel that from a naval viewpoint invading Arctic regions would be something like breaking into jail—it might be easier to get in than to get out again. Neither one would be easy. And most certainly we could interfere seriously with support of enemy operations in isolated regions.

Q. Is there any basic military advantage of Russia's interior position, or of the United Nations' position around the perimeter of Russia and its satellites?

A. There is an old military principle which declares that interior lines are an advantage, in that the forces are fighting closer to their central sources of supply. Napoleon was beaten in Russia by the climate and by his inability to supply his army, an illustration of the difficulties of long lines of communication. Interior lines are of themselves no assurance of victory in war. We believe in projecting our power to the places that it is needed, and providing the lines of communication which will enable us to fight, if we have to fight, in the other fellow's front yard, rather than in our own.

Q. In getting there first with the most—according to the precept of General Bedford Forrest—do you think that the advantage lies with Russia with its lines of land communications, or with the United States, whose lines of communications are solely by sea and air?

A. From the American viewpoint, the greatest factor lies in our ability to project our power to any part of the world. Our forces are provided to support the policies of our government. We don't want war or any part of it. If it should be forced upon us we don't want to fight it at home, and that is one of the reasons that the Navy is in business.

15 YEARS AGO

FROM the December 1936 issue of this magazine.

Fleetwings Sea Bird is the first stainless steel plane built for commercial purposes. Powered by 285 hp. Jacobs radial air-cooled engine with direct electric starting, mounted above cabin, it

cruises at 135 m.p.h. It climbs at the rate of 900 feet per minute and has a 15,000 foot ceiling.

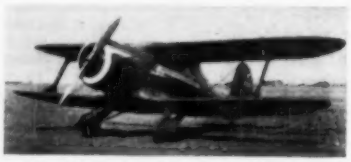
A project to form an air force of nations to be under the auspices of the League of Nations for the purpose of enforcing the decisions of the Geneva body was made public in Paris.

The distinctive feature of the Pitcairn autogiro is its roadability. This feature makes it quite possible for the private

owner to house the plane at home and drive it to the nearest suitable field for take-off. It can take off in less than 150 speed and has a landing speed of 20 m.p.h.

An airline operating in a very damp tropic region, pointing out that engines perspire, has advised its personnel to wrap the magneto wires and other electrical equipment with newspapers to absorb moisture when the ships are left out overnight.

Negatively staggered biplane wings and deeply filleted connections are characteristics of Beechcraft's Model C17B.



Its landing speed is 45 miles an hour and it is capable of getting nine and a half miles per gallon of gasoline.

TWENTY YEARS AGO

Two young Frenchmen have just perfected a non-inflammable gasoline for use in airplanes. In recent tests neither flames, electric sparks, or red hot pokers could ignite the fuel. They do not intend to make money from their invention, but will give their secret to the world to advance aviation safety.

TIME-SPLITTERS

By Victor Black

SIXTY-FIVE YEARS AGO in America, hardly anybody knew what time it was. If Mrs. Murphy wanted to see whether her apple pie was done, she didn't depend on a fancy clock on the oven. She stuck a broom straw into it. Time, as such, had little real meaning to the Murphys.

Not so today! The Murphy's great grandson may be an engineer working in the guided missile field. Things happen quickly when a missile is fired—so quick that not even Uncle Sam's standard Naval Observatory Time is good enough for the scientist, because of slight errors in relaying the signal from the East Coast to wherever the test may be taking place. The rocket engineer needs something more accurate. For men like Mrs. Murphy's great grandson, guided missile scientists have devised a time system of their own. And it is accurate. It is allowed an error of one *second* in *one billion seconds*, or roughly one second in 31 years!

When grandpa was a boy there were about 100 different time zones in the country, none defined very clearly. And if your uncle's watch was five minutes faster than that of Brother John, both were probably right. It took the railroads to straighten things out—in 1883—when they established five time zones and got the trains to running on "railroad" time instead of "sun" time.

Enough for what the history books say. Let's take a look at a guided missile "time machine." First, the engineer will not permit you to call it a time machine. It's a "precision crystal oscillator." Because there was a need for fantastic accuracy in guided missile research, some scientist made a crystal, ground to such precision that, when it was started vibrating with an electric current, it vibrated at exactly 100,000 time a second. To maintain this accuracy, the crystal—the heart of the "time machine"—is encased in a moisture and air-pressure proof oven and kept at an exact temperature.

Here is where some tricks come into the picture that are too complicated to explain briefly — tricks learned by the radio and electronics boys. In vibrating at 100,000 times a second, the crystal actually becomes a generator—due to its movement—and puts out a voltage of the identical frequency of its vibration. Through the abra cadabra of electronics, this voltage is split up into 12 different frequencies, from the original 100,000 vibrations per second down to 10 cycles per second, which are actually visible to the naked eye through use of a picture tube. All of these 12 frequencies are piped into various laboratories for use by engineers working on guided missile problems.

Suppose now that a scientist is working on a missile fuel problem and wants to know how long it takes the fuel to ignite after the starting switch is thrown on a rocket motor. That it happens "instantly" he knows. But that is not accurate

enough. He wants to know just how quick "instantly" really is.

To get the correct time, the time splitters make up a hodge-podge of vacuum tubes and scrap of the trade into an electronic "counter." This "counter" is usually a panel of lights, which add up the "vibrations" from the standard frequency in multiples of 1000, 100, 10 and one, much like the office adding machine adds up figures mechanically. A wire from the "counter" is attached to the starting switch of the rocket motor. A photo-electric cell, also attached to the counter, is aimed at the flame exhaust port of the motor. Ready for the test, the scientist throws the motor switch, actuating the counter. At the same "instant," the photo-electric cell records the rocket motor flame and turns the counter off. A tally of the lights on the counter panel tells the scientist that the motor start has taken exactly 5,210/100,000ths of a second!

This illustration of how the "time machine" might be used to obtain information in the laboratory or on a rocket motor test stand is as simple as the letters A, B and C are to the man who can speak seven languages. In actual practice, uses of the time standard frequencies are far more complex. Test flights of missiles, for example, often call for the sending of as many as fifty different kinds of information several times a second back to the ground. When using the "time machine," a running commentary may be obtained on the missile's supersonic speed, temperatures, pressures, directions, attitudes of control surfaces, etc., all synchronized with a super-accurate crystal-controlled time standard. The "time machine" can be used just as advantageously when static firing rocket motors on giant test stands, like the North American Aviation stand in the Santa Susana Mountains of California.

Very small intervals of time are important to men working on problems of guidance and control, fuel supply, and hundreds of others in long-range rockets flying many times the speed of sound. And if it were not for the accurate time standard, it is conceivable that the long-range rocket of the future, instead of landing on the moon or Mars, or other planet, might veer from its course and let its passengers out at a fish wharf on San Francisco's waterfront. END

THE FIRST UN BULLET

AT 9:30 A.M. on the morning of June 27, 1950, a black F-82 *Twin Mustang*, piloted by Lieut. Col. James W. Little, peeled off from 7,000 feet and began firing at a North Korean LA-7 type aircraft that had come out of a cloud bank and attacked the last man in a lower flight. Thus, Colonel Little became the first man to fire a shot for the United Nations in the Korean action.

Three flights of the "all weather" F-82 fighters had been assigned the mission of protecting United States aircraft that were evacuating American civilians from Kimpo airfield at Seoul, Korea.

They had arrived over Kimpo and were orbiting while the transports on the ground were being loaded. Suddenly, Colonel Little's radar observer, Capt. Phillip E. Porter, called Little on the inter-phone and asked him what the single-engine planes were doing in the area. Banking his plane to the left, Little saw the enemy plane making a firing pass on the friendly aircraft. There was a second enemy plane flying behind the one making the firing pass, and without hesitating, Little made a diving pass at the first enemy plane.

As he got closer he could see that the enemy plane had caused some damage to the friendly aircraft's tail surface. . . . He turned on his gun switches and pressed the trigger. His six caliber .50 machine guns began firing and the enemy LA-7 began to burn and crashed into the ground near the runway. After setting the first plane on fire, Little continued his pass, firing on the second enemy plane, but he turned into the cloud bank at the edge of the field and was lost from view. Little's radar observer saw the first aircraft hit the ground. The enemy pilot did not bail out.

Two other pilots in Colonel Little's flight that morning were credited with kills of enemy aircraft. They were Capt. William G. Hudson, of Selma, Ala., and 1st Lieut. Charles B. Moran, of Horse Cave, Ky. Moran was later missing in action from a combat sortie.

The day Colonel Little fired the first shot for the United Nations in Korea, Far East Air Forces pilots destroyed seven enemy planes with no loss to friendly aircraft. This was the start of establishing air supremacy over Korea so our friendly ground forces could move freely with no fear of enemy air opposition.

Colonel Little led his F-82s on many different types of missions during the first few months of the war. They flew day and night intruder missions, close support for friendly ground forces, armed reconnaissance and interdiction. They also flew escort for General MacArthur's first two trips to Korea. Weather reconnaissance flights were made to gather information for B-29 Superfort daylight missions against strategically important targets.

Colonel Little flew 50 missions in Korea, and recently he was reassigned to an airbase in Japan to take command of an all-weather fighter squadron. END

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Pilotless Bomber

(*Continued from page* 29)

However, until new weapons and new military applications of atomic energy are available for field use, our national safety in the face of attack depends upon improved conventional weapons in ample quantity and with sufficient trained and equipped ground, naval and air forces to use them effectively.

"Many future weapons may be dramatically different from our present armaments. Meanwhile, however, we must rely upon proved, tested and available models to win today's battles with the men presently trained to use them. A guided missile on the drawing boards or at the proving ground can't win 'Heartbreak Ridge' in Korea tomorrow."

A few days later, Adm. William M. Fechteler, Chief of Naval Operations, said:

"I strongly suspect that most of our conventional weapons are not, within the foreseeable future, going to be replaced with new devices any more than the rifle has been replaced by the machine gun."

He said that war is still basically a problem of foot soldiers and probably always will be, despite development of atomic weapons and long-range guided missiles.

The *Matador* is the forerunner of a whole new array of tactical and strategic weapons which will be the conventional weapons of a tomorrow 10 years or so ahead.

The *Matador* did, however, inject an interesting new note into the current controversy among the military services over control of tactical air power.

Of particular interest to close observers of the inter-service debate on that question was the disclosure that the Air Force had built its first tactical squadron of pilotless planes around a ground-to-ground missile. It is not fired or launched from an airplane and, according to available information, is not guided by an airplane. In effect, it is another piece of artillery. It is launched from a tractor-drawn trailer which incorporates a special cradle for the bright red "bird."

How big a part the *Matador* might play in the wrangle over tactical air power and who is to control it is questionable, since the controversy is centered now on the doctrine of close support. The *Matador* is not a close-support weapon in the sense that the piloted fighter aircraft is. Rather, it would be used to bomb enemy supply lines, airfields and other concentrated ground targets well to the rear of the enemy's front lines. Close air support calls for the smashing of front-line installations, troops and other forward targets from the air.

The *Matador* and any other Air Force weapons which have nothing to do with an airplane may, however, come in for close scrutiny in the coming top-level debate on the AF theory of tactical air power. That theory is, essentially, that superiority over the enemy's air force must be won before the Air Force turns attention to close air support of ground troops.

The Navy, the Marine Corps and the Army Field Forces hold to the belief that tactical air power, particularly close air support, should be controlled absolutely by the ground commander in the field. The Air Force believes that its first job is to get the enemy air off the backs of our troops. It also is convinced that all tactical air missions, including close support, should at all times be under joint control of Air Force and Army officers—with final command decision resting in the hands of the air officers. END

Traffic Control

(*Continued from page* 27)

During instrument weather at a terminal area, aircraft are "stacked" at 1,000-foot vertical intervals, flying in circles and waiting their turn to land. The bottom plane in the stack is directed to make its landing approach, and then the planes above are "laddered down," 1,000 feet at a time. It's like dealing off the bottom of a deck of cards. Several of these stacks operate simultaneously in busier terminal areas.

Here, again, the traffic controller is dependent upon the pilots' reports of their positions. Because safety comes first, no plane in the stack can be moved down until the controller has been assured by radio that the plane next below in the stack has vacated its altitude. This procedure is cumbersome, it is annoying to pilots and passengers, and it requires a tremendous amount of radio conversation to keep continuous track of all the planes involved.

With radar, the traffic control situation is quite different. Each plane can be watched on the radar scopes, and much of the radio chatter eliminated. And because each plane's position is known continuously and accurately, and each pilot can be reached instantly by radio, wide and wasteful separations along the airways are unnecessary. Any pilot can be told, as necessary, to alter his course or speed.

But for all its miraculous qualities, radar—at least in the form installed at Washington—has certain limitations. The equipment gives no altitude information; it merely shows the position of the plane in two dimensions. Identification, too, is a problem. All aircraft look much alike on a radar scope. Yet the controller must be sure which aircraft is represented by a particular pip. Otherwise, he would risk giving traffic directions to the wrong aircraft. Furthermore, the radar equipment installed at Washington was made for other purposes, and is far from ideal for traffic control.

New devices are being developed to meet some of these limitations. One is a "radar safety beacon" to be carried aboard aircraft. This, upon being electronically "queried" from the ground, would automatically transmit signals identifying the aircraft on the radar scope. Another device is the very high frequency automatic direction finder. Already in limited use, this gadget paints a thin line of light on the face of the scope whenever the pilot uses his voice radio. The line of light passes through the pip of whatever aircraft is transmitting at the time.

Top-level operational and technical experts, through the Air Coordinating Committee, spent about a year on intensive study and experiment in the field of radar traffic control. This Special Working Group Five, known in aviation circles as "SWIG Five," issued a 147-page report on the whole complex subject. Called "Air Traffic Control and the National Security," is available for 65 cents from the U. S. Government Printing Office, Washington 25, D. C. The radar traffic control center at Washington is a direct outgrowth of this study.

Those responsible for the radar operation at Washington are not very specific in describing details of its proposed operation, since one of the purposes of the center is to develop the best operational procedures. The general outlines, however, are quite clear.

Let us suppose that an executive aircraft is flying from New York to Washington under instrument conditions. The pilot has filed his flight plan in New York, and is between Philadelphia and Baltimore at his assigned altitude.

He first comes under radar control well north of Baltimore, when the pip of his aircraft appears on the 10-inch MEW scope of the controller assigned to watch the area northeast of Washington. The controller's first problem is to be certain that the pip of the screen is that of the executive plane, which he has been expecting because of the information in the flight plan. To make identity certain, the controller may ask the pilot to make a right turn or other maneuver, which will show on the screen as a corresponding movement of the pip.

As the flight progresses toward Washington, the controller watches the executive aircraft, and the others along the airways, to be sure that no plane overtakes another at the same altitude, or approaches an airway intersection in conflict with another plane.

Each controller maintains the old-type manual cards in a rack beside his scope. This makes it unnecessary for the controller to carry details of each flight in his mind. More important, it permits the whole operation to change instantly from radar control to manual posting methods in case of a breakdown in the radar equipment. This will be necessary for safety reasons until every part of the complex radar gear is duplicated by standby equipment.

When the approaching executive plane is about 40 miles from Washington, it will be "transferred" to the controllers watching the face of the big VG-2.

At first glance, these controllers seem to be playing some fantastic kind of

chess, moving tear-shaped plastic markers across the flat face of the VG-2. Close inspection shows that each marker points to an aircraft pip, and that identification information is written on each marker. These transparent markers are in five colors: amber for Air Force planes, blue for Navy planes, clear for air carrier, green for itinerant, and red for any unidentified plane which might appear.

The executive plane, of course, gets a green marker, and goes onto the terminal area chess board. The busy controllers move the planes, as efficiently as possible, to gate positions where they can begin their landing approaches. The final stages are controlled by the traffic controllers in the tower, and the landings are made by standard instrument landing system procedures, or by "talk down" precision approach radar.

While all this is going on, controllers at the other VG-2, or at two of the smaller MEW scopes, are busy directing outbound planes. These planes are assigned certain headings and altitudes. They follow these unless the controller, watching his scope, sees a potential conflict. In such a case, he directs one of the pilots to take a new heading or altitude.

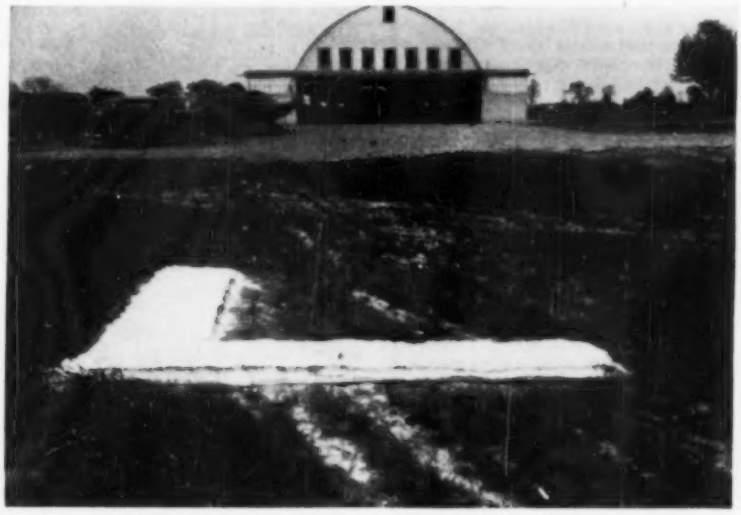
Radar enthusiasts believe that the new radar traffic control methods will eliminate conventional stacking, in which planes are held one above the other at 1,000-foot intervals. Instead, they offer a concept of "stacking in motion." Under this plan, each plane coming into the area is moved, slowly or rapidly as necessary, toward the gate position. Time spacing would be such that the planes arrive at the most efficient intervals for successive landing approaches.

Simple as this may sound, it is not as easy as lining up automobiles trying to drive through a ball park gate. Modern aircraft move at high speeds; they can slow down only to a limited degree. Furthermore, the aviation chess game is in three dimensions instead of two, with arrivals from all directions, and simultaneous departures.

Out of this radar center experiment will come a wealth of practical knowledge. New and better ways of solving modern air traffic control needs will become apparent, and sound facts will be developed concerning just what radar can or cannot do in this field. For the first time, it will be possible to specify and build radar equipment which is ideal for the specialized needs of traffic control.

END

SAFETY MARK



HERE IS an easily-made airport corner marker that sticks out like the proverbial "sore thumb" not only from the air, but also while taxiing around the field. Its super-white surface is quickly spotted. But, if it is inadvertently struck or even run over, nothing is damaged on the plane or marker. The construction cost is next to nothing and all necessary materials are obtainable locally anywhere. The maintenance of grass and weeds is greatly reduced by the use of materials which discourage their growth, so that they are not as likely to become obscured as the more conventional raised markers which are made of wood or metal.

Both legs of the marker shown in the picture are 10 feet long and 24 inches wide. It was made by first laying 36 inch widths of heavy black building paper or roofing paper on the ground. Two inches of fine blue stone mixed with white hydrated lime is then put on top the roofing paper. For the final surface, a one-half inch thickness of plain white hydrated lime is applied. The roofing paper is six inches wider than the lime and blue stone to insure against grass and weeds and to aid the grass cutting around the marker.

The photo was taken about a month after installation, and apparently the wind and rain had little effect on the appearance, according to the Pennsylvania Town Airport Manager who devised the marker.

—Bob Blatt

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HOME STUDY

The Pole Vaulters

(*Continued from page 25*)

by a battery of instruments capable of telling him the atmospheric conditions in the cold space outside to the smallest detail. Precise thermometers, hygrometers and a host of other gauges are the tools of his trade. He must read them like a book and translate their meanings into a code which can be transmitted in Morse over the tremendous distance between the plane in flight and the nearest radio station at Point Barrow, on Alaska's North coast. Voice contact is impossible to maintain, so dot-and-dash transmission is used.

Another expert—until only recently his job was marked "secret"—is the dropsonde operator. The dropsonde is a miniature type of weather station, dangling from a parachute as it floats earthward. It is affording Air Weather Service meteorologists a new method of exploring the upper atmospheric regions over such remote areas as the North Pole.

Until several years ago, meteorological data was obtained primarily by use of the mercurial barometer, the wet and dry bulb thermometers, the recording anemometer and the wind vane. For upper winds, a hydrogen-filled balloon was followed in its flight with an instrument resembling a surveyor's transit.

The balloon method of determining upper air winds was followed by new methods recently developed for recording upper air observations. These new techniques include the use of the radiosonde and the dropsonde.

Radiosonde is a device involving small pressure, temperature and humidity measuring instruments which are carried aloft from the ground by a free balloon with a radio transmitter attached to relay information to a ground receiver.

Dropsonde is essentially the same instrument, except it is equipped with a parachute and is dropped from the B-29 weather planes in flight. The dropsonde is designed to obtain atmospheric pressure in millibars, the temperature in degrees Centigrade, and the percentage of relative humidity of the mass of air through which it falls. In effect, a series of weather stations is originated at each of the fixed positions along the weather plane's flight track where observations are recorded. On a round-trip from Alaska to the North Pole, more than 20 dropsonde observations are recorded.

As the dropsonde floats to the icecap below, meteorological data is recorded by three weather measuring devices: (1) a twin aneroid cell to measure pressure; (2) a bi-metallic temperature element which expands and contracts with changes in temperature, and (3) a human hair hygrometer to determine relative humidity.

A continuous record of data is relayed to a radio listening post in the aircraft by a self-contained transmitter in the dropsonde, which sends coded messages designating the readings of the three weather recording devices. As each condition of weather changes, a different series of coded signals are transmitted. The dropsonde transmits approximately 12 code groups per minute while descending at a rate of approximately 1,100 feet per minute.

Each "Ptarmigan" flight starts some 24 hours in advance of the actual take-off. The crew of 12 to 14 men meets in the briefing room the day before, usually in the morning. There the aircraft commander delineates the singular features of the particular mission. These would include such things as extra crew members, deviations from flight track, take-off times and the like.

Then each crew member takes the floor and goes over in detail that phase of the mission pertaining to his specialty. It is significant that, even though the details don't vary from mission to mission, they are repeated at each briefing. Location of survival gear, emergency procedures, sequence of operations—all of these things are gone over and over until they are second nature to the well-trained crews.

If a "Ptarmigan" flight should encounter difficulty on a trip, trained crews of the 10th Rescue Squadron from Ladd Field, Fairbanks, Alaska, would take-off in a matter of minutes, heading for the rescue. The 10th Rescue is a special project, following each "Ptarmigan" flight by radio and radar every inch of the way on its long and hazardous flight. Its own planes are specially equipped to make the run all the way to the North Pole, if necessary.

The briefing over, the crew disperses for the day, relieved of all other squadron duties. Most of the members go home and spend the rest of the day relaxing for the exhausting grind ahead. They eat lightly and go to bed early. They have to be up at 3:30 a.m.

After a special breakfast in the mess hall, they dress for the flight. Five layers of clothing are involved in this process. First comes the long underwear. Over that is worn a wool shirt and trousers. These are in turn covered by an electrically-heated suit of nylon or spun glass fabric. Over this goes a wool gabardine flying coverall. On top of everything is worn a fleece-lined outfit consisting of trousers and parka, quilted like a heavy blanket, but deceptively light for all its bulk. Feet are encased in three pairs of heavy wool socks, electrically-heated inserts and huge felt shoes with three thicknesses of soles.

At 6:30 a.m., the crew assembles at the aircraft. Aboard the plane are 7,800 gallons of gasoline. Also more than two tons of survival equipment. The plane, fully loaded, weighs 134,000 pounds. The flight is ready to start.

In the frosty silence an engine coughs, sputters, comes to life. Another catches. Then another and another. All four propellers are now turning over. The high-tailed B-29 lumbers forward, wheels aground, and heads for the end of the runway. It starts its run. Slowly at first, gathering speed as it flashes down the two-mile-long runway. It's off the ground. Slowly, it gains altitude over the snow-tipped evergreens below. The long flight to the Pole has begun.

During the next 17 hours—five of them over land, twelve over the ice-covered ocean—a steady intense routine goes on inside the plane, flying at 18,000 feet altitude. Everything done by any one crew member is precisely geared to the work being done by all the others. As the navigator takes a fix, he knows he must finish it in a few minutes so it will be ready for the radio operator's half-hourly position report to the waiting station on the ground.

As the meteorologist plots his pressures, he plans to be free within a minute or two so as to receive the radar operator's latest wind report. The radar operator knows that exactly 25 minutes past the hour and five minutes before the hour, he must have a drift reading for the navigator.

☆ FLAT SPINS ☆

This beautiful brave new world! A method of packing eggs has been developed so that they can be dropped from an airplane without damage.

Our Times! The other day a resident of Orkney Island, off Scotland, saw his first railway locomotive—and he was in a plane at the time.

If you should be in the serene solitudes of the Ontario outdoors and suddenly hear a voice out of the sky, don't light out for the couch of the nearest psychiatrist. The chances are that you are really hearing a voice from the sky, emanating from a sleek yellow plane. It's part of the government's program to keep reminding folks that they can help cut down forest fires. The broadcast from the plane asks people to be careful with their matches, etc. Backed up by a 100-watt amplifier, the pilot can make his voice heard plainly on the ground from an altitude of 1,800 feet over a five-mile radius.

A radio that wasn't turned on awoke a man in Hawthorne, Calif. It came through the ceiling after falling from a jet fighter.

Yep, there'll always be an England. Leading jet plane designers from western nations met recently in London to honor the anniversary of the first jet flight in England 10 years ago. Invitations to a dinner honoring the event specified "carringes will call at 11:30 P.M."

Dr. John Wu of Honolulu knew a good thing when he saw it. He took an airline up on its offer to fly families at half fare and headed for New York. Dr. Wu has 13 kids.

In Korea, a Navy pilot discovered a new use for the metal tail hook on his Corsair, intended to stop the plane when landing on an aircraft carrier. Capt. George E. Mouzakis spotted some Communist telephone lines. He swept down low, lowered the hook and ripped loose the enemy's communications.

At Brantford, Canada, George Gammack gulped and took another look—but there it was, an airplane waiting for gas outside his station on the busy highway. "Fill 'er up," said the pilot. "I haven't got enough to get home." Gammack filled the tank and the pilot took off down the highway. Gammack has a picture of the plane at the pumps to prove his story.

—*Harold Helfer*

The pilot does not have to be told that at exactly 24 minutes after the hour he must drop 100 feet to afford the weather observer a reading at a specific predetermined altitude. The radio operator hurriedly finishes his message so his set will be off at the precise time the dropsonde operator lets his device go through the pressure hatch and monitors his radio set to pick up the faint signals from that remarkable instrument. That's the way it goes—every operation interlocked with every other operation.

Heading up over the snow-capped Brooks Range, the plane wings toward Point Barrow, its last point of contact with land. From there, a brief stretch of open water, then comes the ice pack. All the way to the Pole, nothing lies below but solid ice, broken here and there by a thin tracery of black lines—cracks caused by tides and drifts. Finally, at the Pole, a turn is made and the plane heads back South by a different route, reaching Alaska at Point Hope, on the western coast, just across the Bering Straits from Siberia.

From there, a slow let-down is made, calculated to have the plane at 2,000 feet by the time Fairbanks is sighted. Co-incident with the arrival at Point Hope, a let-up in work is detected. The weather observer ceases his calculations, the navigators relax and let the radar operator direct the plane by fixes on known mountain peaks and rivers. The dropsonde operator folds up his reports and seals his hatch.

Real work-horse of any "Ptarmigan" mission is the automatic pilot. It flies almost the entire mission. This is because it alone can hold a heading to the precise tolerance required by the navigator over the ice-pack.

Flying to the Pole is a lonely business. Occasionally, though, the 58th has company. Russian aircraft—huge, four-engined planes closely resembling our own B-29s—have, and are, being sighted weekly above the 90th Parallel.

What happens when a USAF plane meets a Russian Air Force plane over the Pole? That's one subject on which the 58th and the Pentagon aren't talking. END

I Learned About . . .

(*Continued from page 38*)

The plane continued to smolder and smoke. We all stood a safe distance away just in case there should be an explosion. Ten minutes later, like a bunch of cautious kids approaching a lighted firecracker on the Fourth of July, we gingerly returned to discover the fires had burned out. The horrible smells were still there.

From a nearby farmhouse, I called Norfolk to close out my flight plan and keep CAA happy. Another call to Chincoteague brought a bus and slower but smokeless transportation toward the larger northern cities for our pyrotechnic passengers. The reputation of FUBAR had been upheld.

Harris, Donnelly and I remained with the plane that night. It wasn't until the following day, when a repair crew flew up from Norfolk, that we learned the whole truth and how lucky we'd been.

The starboard cabin heater had kindled the blaze. Deterioration of the starboard exhaust stack allowed exhaust flames and gases to enter the heater jacket. When Donnelly opened the heater valve, intense exhaust flames were forced into the light aluminum heater ducts. This thin gauge metal was not designed to withstand such terrific heat. And if you don't think aluminum will burn, you should have seen the charred remains of those cabin heaters.

Since the exhaust pipe and heater jacket are on the lower outboard side of the engine nacelle, the heat, under normal conditions, is piped through the afterpart of the engine nacelle toward the fuselage. Thus, it passes close to the tire of the retracted starboard wheel.

The seared starboard tire had a charred knob on it the size of a man's fist. If we had not fortunately put the wheels down as soon as we did, that tire would probably have blown out, adding to the difficulty of the landing. The hydraulic lines were burned out so that it was only the mechanical lock which kept the landing gear in the down position. We must have put the wheels in the down position before the hydraulic lines let go.

With the engines shut off, our difficulties were over, but of course, we didn't know it. There was no more exhaust causing the fire. However, the wind, whipped up by our dive for the ground, fanned the blazes which were already started. On the ground these flames immediately went out.

In talking to the higher echelon back at Floyd Bennett, I learned another pertinent fact which could have aided considerably, had I known about it earlier.

There is an emergency escape hatch in the overhead between the pilot and co-pilot seats. I had seen Donnelly open the hatch during pre-flight checks, and, standing on the arms of the pilot and co-pilot seats, lean out to clean the windshield from the outside.

Well, the boys in the know told me that hatch was not put there to accommodate windshield wipers. If we had jettisoned the hatch when the fire started, all the smoke would have swooped through the overhead. Both Harris and I could have avoided the choked-up tearful reaction. Furthermore, if the landing had been in rough terrain, we would have had a ready-made exit.

I am very proud of my Navy wings and jealously guard the privilege of wearing them, and would never seriously consider turning them in. I have learned that flying is a personal challenge. As an individual you have to be sharp, and stay sharp, to remain healthy in aviation.

I learned to anticipate the abtruse; to expect the unexpected. END

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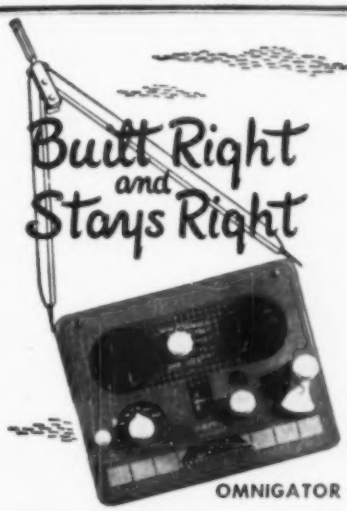

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(*Continued from page 13*)

combustion chamber. The combustion chamber is a single ring instead of eight or so individual combustion chambers or "cans" as in American and British practice. The BMW-018 had a three-stage turbine for improved efficiency at high altitude but the -028 engine had four stages and internal reduction gears to drive the propeller shaft.

The BMW-028 was rated at no less than 7,000 shaft horse-power-plus 3,000 pounds additional thrust from jet action! This rating has undoubtedly been increased since Russia shipped all BMW technicians and test equipment back to Russia to complete its development. This engine may be roughly compared to our own J-57 scheduled for the B-52 and B-60 (sweptwing B-36). The above ratings when multiplied by six installations are just about right for powering a plane of the size, speed and altitude of the TuG-75.

There is no doubt that the use of turbo-props "makes" the TuG-75. Turbo-props allow higher speeds for a given range than do piston driven aircraft and better range than do fuel gulping pure jets. Piston driven craft have the greater maximum range but to achieve this must cruise much slower than either turbo-props or pure jet aircraft.

The use of turbo-props then, gives a high cruising speed and a range somewhat in between a piston-driven bomber and one pushed along by pure jets. The TuG-75, then, has perhaps 2,000 miles less range—as a basic airplane—than the B-36B or B-36D (with jet engines added to the reciprocating installation), but its top speed is probably greater by as much as 100 m.p.h. Its combat altitude and maneuverability over the target, however, is probably slightly less.

As to range, engineers experienced in large aircraft point out that once the required range and speed has been established and the power plants selected, that neither the Russians, nor anyone else for that matter, can do any basic juggling with certain elementary design features. In order to achieve maximum range the following design features must be rigorously adhered to—and the success of the design will depend entirely on the ability of the builders to equal the very best that can be accomplished at the highest level of design art. These are: (1) *Extreme* light weight of basic airframe, (2) *Maximum possible fuel economy*—a minimum specific fuel consumption—that is, the smallest possible weight of fuel burned per pound of thrust. (3) *Extreme* aerodynamic refinement—particularly long thin wings and careful streamlining throughout. Since a light basic airframe weight is an absolute *must*, it is easy to see why Russia's crack structural engineer, Gurevitch, was put on the job. A pound of excess structural weight means a pound of fuel off-loaded—and a fraction of a mile less range.

The best way to achieve low structural weight is obviously to reduce the stresses in the main components as much as possible. This would be done by loading as much weight as possible along the wing span. Thus the lift is directly counteracted, reducing wing stresses and hence structural weight. With the engines and all the fuel that can be stored strung out along the span—perhaps as much as 80 per cent of the total weight can thus be used to reduce wing weight.

Consequently, the bet is made that the wing of the TuG-75 is little more than a glorified gas tank. Only certain cells would be bullet-proof and these cells would be purged with carbon-dioxide from the engine exhaust to reduce the danger of explosions due to gun-fire. The Russians had purged gas tanks in World War II. We didn't.

The reason for only certain cells being so protected is simple. On a bombing mission of the range considered, only a portion of the flight would be in a zone of combat and a lot of the original take-off fuel would be burned up by the time combat was reached. More than half of the fuel would be burned on the outbound leg of the mission. With a gross weight of something like 350,000 pounds at take-off, probably most of what must amount to some 35,000 gallons of fuel would be in the wings. Only lack of space would spill the remainder into the fuselage center-section. Of the remaining 140,000 pounds, incidentally, about 90-100,000 pounds would be structural weight and the rest, bomb load and electronic equipment. This is a guess—but based on experience with planes of this type.

However, one fact is known—the TuG-75 carries rocket boost for take-off. Whether this is used as in the case of the B-47 to shorten the take-off at high gross weights or to lift the huge giant off from shorter air strips is not known. It is believed, however, that Russia has few if any two mile runways for inter-continental bomber operations. Thrust augmentation in the form of after-burners or water injection has apparently not been developed in Russia to the extent that it has in America and England. Actually, Russian jet philosophy follows that of the Germans. Ours generally follows British practice.

After Germany fell and the Russian hordes overran the aircraft and engine factories—pushed back by our strategic bombing into Eastern Germany—few if any secret German developments escaped the voracious pilfering of Russian advance agents. They completely cleaned out both the BMW and Junkers factories —who were in Germany, what Pratt & Whitney and Curtis-Wright are to us.

The BMW concern had hidden two small experimental laboratories at Baasdorf and Zuhlsdorf—several miles north of Berlin, and here they had developed a small boost rocket to fit on either a BMW-003 or Jumo-004 jet engine. This BMW-109-718 rocket unit weighed only 125 pounds—but developed 3,000 pounds of thrust on nitric acid and jet engine fuel. The boost rocket unit bolted on to the top of the jet engine tail-pipe and its fuel pumps were driven by the jet engine. It was along in its development and had, in fact, been tested on a Me-262 jet fighter.

The Russians captured all of this equipment and took all personnel working on the project back to Russia. Later, they used it on several of their jet fighters. It undoubtedly develops more thrust now and perhaps uses a different fuel, but it is a sound counter-argument to the use of the heavier and more complicated after-burners we use on jet engines. Such units would materially boost the take-off power of the TuG-75 and allow a material overload in take off and thus extend its range to perhaps the 10,000 mile range of the B-36B. In fact, the rocket boost can serve a double purpose just as the jet engines do on the B-36D. They allow a higher take-off weight and allow short bursts of extreme speed when attacked. It is one of many German aeronautical devices we found—and ignored after the war. The Russians didn't!

Little is known about the armament carried. The TuG-75 probably carries a crew of no more than five and, like the B-36, depends a lot on altitude and speed to get to the target—and out of trouble. There's probably very little armament aboard—and that facing to the rear. The weight of armament taken out allows altitudes that present day fighters can't cope with. The argument has been hot and heavy—put dozens of guns aboard and you pull the plane down to a level where guns are needed. Take them off, and the added altitude makes guns unnecessary.

That argument, plus the obvious speed of the TuG-75, tends to support the theory that very little armament is carried as compared to the 16, 20-mm cannons of the B-36. It undoubtedly parallels the armament of the B-47 more than the B-36, B-29, B-50 types. Since low muzzle velocity machine guns are worthless under the stiff combat conditions at high altitude speeds approaching the sonic, the odds are that rockets if not now on the TuG-75—are planned.

Russia captured plenty of German Mauser 213 c 30-mm guns and R4/M supersonic air-to-air-rockets to bolster their own formidable array of aerial armament. The Mauser fires at a rate of 1,100 rounds per minute and was a crack gun used by the Germans during the war, perhaps the best used.

The real punch available to the Russians, however, is the R4/M rocket—a 7¾ pound supersonic missile with a speed of Mach 2.0—1,400 m.p.h. able to catch any sub-sonic fighter. It has a warhead of 1.1 pound of explosive—enough to tear up a fighter boring in and send him on down.

The Russians now have an atomic bomb —and the means of delivering it. If the TuG-75 flies this year it means that in two or three years their Long Distance Flying Command will have a fleet of long range bombers capable of hitting the North American homeland. In the meantime, we will have sweptwing B-36's and B-52's. The sweptwing B-36 (the B-60) will fly this year, the B-52 in 1952.

Each can hit the heartland of the other —and retaliate. Let us hope that our diplomats are more successful than in the past. Who was it who once said that war was merely the continuation of diplomacy by other means? END

Bill Renshaw
State Fairgrounds
Indianapolis 5, Ind.

VIA AIR MAIL

Flying Farmers, U.S.A.

CROPPERS CROP CROY

"Who is this self-styled flying farm expert named Croy?" is the tone of the letters flooding our desk since we quoted brother Croy (September FLYING).

In his book "Corn Country," Croy made three allegations that Flying Farmers charge have no basis in fact.

First to answer Croy's statement that "a plane on the farm in the foreseeable future will be about as valuable as a left-handed Monkey Wrench" was Glen Tabor of Kansas. Tabor, State Director of the Division of Aeronautics, and a former newspaper editor, says, "The airplane isn't just a gadget out here with which we spray a couple of million acres of wheat each year. Let's see Croy accomplish something like that with a left-handed Monkey Wrench."

Tabor tells of one Kansas farmer, characteristic of many, who checks his cattle many miles from his home with his airplane. This checking, according to Tabor, takes less than a half hour by plane as compared with half a day by car. "And many times after a rain," Tabor concludes, "the cattle cannot be checked by car as the pastures are completely inaccessible."

Hottest protest to Croy's statement came from a dozen or so agricultural writers, like William Mollenhour of Indiana. Well known in the midwest as a columnist, radio commentator, member of the Indiana Aeronautics Commission and a flying farmer, Mollenhour pulled no punches in answering Croy's charge that "a few rich farmers who make their money some other way have planes."

After naming a dozen flying farmers in a small area, all of whom make their money in agriculture, Mollenhour said, "On behalf of several thousand every day dirt-farmers, who are the most progressive people on earth and the first to buy the new things, who own and fly their own airplanes, I suggest that writer Croy try making his living elsewhere—slopping hogs for instance." "More irresponsible articles like this," Mollenhour concludes, "will do nicely to give him a start."

Answering Croy's statement that "a few rich flying farmers have organized clubs just as they organized automobile clubs in the early days," Mollenhour recalled an Indiana banker (now dead and so is his bank) who refused a loan to an embryo automobile factory on the ground that there wasn't much interest in "gas engined buggies," except among automobile club members.

Mollenhour concluded that any "similarity between the thinking of this banker and Mr. Croy's statement on Flying Farmers is purely intentional."

Most FF's who have written re Croy took a delight in challenging his quip "that a farmer seriously using an airplane for farming has been kicked by a mule."

Several of them, good naturedly, remarked that "Croy must have been kicked by something or other or he would never have made such a remark. Then like Glen Tabor, they add, "We hope you will straighten Mr. Croy out."

* * *

INTERNATIONAL DIVISION

The Flying Farmer Organization may soon be International. This columnist has been amazed at the mail he has received from South America and Australia, all expressing interest in creating a Flying Farmer "Wing."

Latest inquiry was from Uriel Valdes of Torreon, Mexico. Valdes says many farmers in his area, where cotton is the predominant crop, have light airplanes, which they use for personal travel and crop dusting. Valdes himself has three *Super-Cubs* equipped for crop dusting, and a *Pacer* which he uses for his own transportation. We are furnishing our neighbor from South of the border information on starting a Flying Farmer "Wing."

* * *

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Ever wonder why the difference when you fly into an airport where business is booming, after having just left one that is ready for burial?

The difference usually is that one has a well-worked out formula for success, while the other waits and hopes.

Recently we visited the thriving Illini Airport, Champaign, Illinois. Business was so good we couldn't resist asking, how come? The partners, Louis Dyson and Harold Hayes, revealed their formula. In a few words it is, "go out of your way to sell aviation in everything you do."

When we asked for an example we were told that all transients are accorded free transportation to town. In fact, transients who stay overnight aren't even charged for tie downs. The partners admit that such a transient program doesn't make them any money, but it does *sell* aviation, which in the long run is exactly what must be done if "little aviation" is to endure.

* * *

THAT GAS TAX

Though aviation gas taxes have been repealed in a few states, the wind seems to be blowing the other way. Careful surveys indicate that a majority of Flying Farmers would vote for an aviation gas tax, if they could be sure of it being used exclusively for aviation. Airlines continue to oppose any form of aviation gas tax. They have been largely responsible for defeating gas tax legislation in some instances.

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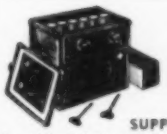

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If War Comes

(Continued from page 31)

match our USAF and Navy jets as they become operational in the coming months. The Communists jumped the gun by being first up with a '51-vintage airplane. Although this super MiG promises to become popularly known as the MiG-19, our sources indicate a strong possibility that the jet may actually be known in the USSR as the MiG-17. Observers who saw the jet at Tushino were impressed with its speed and also with its resemblance—particularly from the cockpit aft—to our forthcoming F-88A *Voodoo* fighter.

Also impressive was the second plane—pictured here by artist DeLancey from crude sketches and photographs and intelligence from eastern Europe. This graceful craft may be capable of speed bursts equal to the super MiG's 700 m.p.h., since it is powered by a rocket engine in addition to its turbojet. Believed to be the handiwork of either Lavochkin or one of the new designers, this ship has not been identified to our satisfaction.

These drawings reveal, however, that the Soviets are making their bid for fighter supremacy with finer and somewhat radical design detail, with combinations of turbojet and rocket powerplants, with heavier, higher-velocity armament, and with radar sighting. The latter, evident in the radar snout, may well overcome the marked gunnery deficiency evident in Korean combat.

The "flat MiG" is actually flatter only on the bottom, since the side-by-side powerplant installation gives the fuselage a triangular cross section instead of the circular section of the MiG-15. The illusion of flatness is heightened by the high shoulder-wing location on the MiG-19.

The plane is larger than the -15. Approximate dimensions of the super MiG are: wingspan, 33 feet, 6 inches; length, 37 feet; height, 11 feet, 3 inches. We have no figures on gross weight, but the super MiG must certainly be in the 13,000-15,000-pound category.

The powerplants are Schvetsov designed, small-diameter axial turbojets, probably the M-004H, rated at 4,000 pounds thrust. (This is a development of the German Jumo .004.) Preliminary reports set the MiG-19 performance at 700-715 m.p.h.; initial rate of climb of 7,000-7,500 feet per minute; and service ceiling in excess of 53,000 feet.

New armament makes the jet more formidable in the form of four 30-millimeter cannon. Although the type has not been established, Russian armament experts have been working for some time on both the German Rheinmetal Mk. 108 and Mauser 213/C.

The outstanding characteristic of the super MiG is its radar snout. This installation is generally similar to that seen on MiG-15 and La-17 fighters. Resembling somewhat the shark nose of our F-86D, the Red radar nose was actually developed from an installation in the experimental German Heinkel P. 1078A fighter. Our sources are not yet certain whether the snoot houses a small dish antenna or a column-type "end-fire array", but they are agreed that this AI (Airborne Intercept) radar is very probably capable of gun aiming as well as search functions. This spells more than just better gunnery.

The appearance of these shark-faced fighters means that the Russian tacticians are striving to give their single-seat fighters the all-weather capabilities reserved previously for the multi-place night fighters—a line of thinking which is of only recent origin in American practice.

By providing USAF and Navy fighters such as the F-88A, F-86D, F2J, F3H *Demon*, and F4D *Skyray* with electronic sensing gear, we will enable these forthcoming single-seaters to fight in darkness or conditions of poor visibility as well as the nighttime jobs, such as the F-94C and F-89 *Scorpion*. Moreover, radar-carrying day fighters can carry out their daylight missions with greater effectiveness for several reasons: The darker sky and glaring light conditions at altitude make it difficult to detect visually other aircraft. And the closing speeds of today's MiGs and *Sabres* are so high that immediate detection is imperative; with tomorrow's fighters, the element of surprise will be even greater. Under any conditions, radar aiming is more reliable than human sighting. This is especially true of combat at MiG and *Sabre* altitudes where even the finest marksmen have difficulty in judging distances. Thus, the appearance of Red radar-nosed single-seaters means that they are catching up fast.

Electronics is the one field in which the USAF and Navy promise to maintain our superiority, and there is probably no comparison between the Soviet equipment and U.S. gear such as the A-1C radar sight. But the point is that if the Red radar is only half as good, the Communist pilots in Korea and elsewhere may be shooting a lot straighter.

In any attempt to evaluate the new Soviet fighters at this early stage of the game, it seems wise to recall what two of the guys who know best said about their stablemate, the -15. Capt. Jim Jabara said: "Next to the *Sabre*, I would rather fly a MiG than any other fighter."

Col. Johnny Meyer, skipper of the *Sabres* until the present commander, Col. Francis Gabreski, took over, said: "The MiG is one of the world's two best existing planes for air-to-air combat, judged solely on flying characteristics."

If the new super MiG is a chip off the old Mikoyan-Gurevich block—and there's every indication that it is—the fighting promises to be a lot tougher over Korea or the next country over which Yank jets tangle with Reds. END

THE CART BEFORE THE PLANE

TO ELIMINATE the necessity for making several trips back and forth between the gas pit, office and hangar for getting ladders, cleaners, tools and making change, this combination multiple service cart was designed and built by Dick Bircher for use at his Boulevard (Philadelphia) Airport. It has been in constant use for several years. It has not only won the praises of linemen, but itinerant flyers as well, since the usual servicing time is cut considerably.

The cart carries air for tires; several grades of oil; windshield cleaner and rags; screw driver, pliers, wrenches and other tools; a sales register; cash box and whisk broom. It serves as a step ladder for high-wing planes and is easily wheeled under the cowlings of light planes. The air tank is a safe standing base for the service man so that he does not have to stand on the tire, undercarriage or wheel pants.

A hinged gas flag is left in the upright position at the gasoline service pit where it can be seen by visiting pilots. During servicing the flag is dropped so that it will not strike wings or fuselage.

The cart is made of welded steel tubing and steel plate. A pneumatic wheel barrow tire provides the moveability.

—Bob Blatt

Cart serves as stepladder for use in servicing, carries much equipment.

TAILWHEEL CHOCK

HERE IS an easily-made tailwheel chock that is used in connection with a wing lift to keep the tailwheel in place. It also holds the plane while service work is in progress on the wheel, tire, brake, shock cord, or other repair or maintenance job which requires the raising of the wheel. It is especially helpful when used for a full-swivel tailwheel since it is almost impossible to hold the plane even when the other wheel is chocked.

The chock is made from a three-quarter inch thick wooden board, cut to about six inches wide and 10 inches long. A rectangular opening is cut in the middle of the board to accommodate the tailwheel. The sides of this opening hole are sloped to form a better fit for the tailwheel tire. The chock is painted green to make it more easily located on a light concrete hangar apron. D. L. Craft, Manager of the Gulfport Air Service, Gulfport, Miss., is the originator of this idea.

—Bob Blatt

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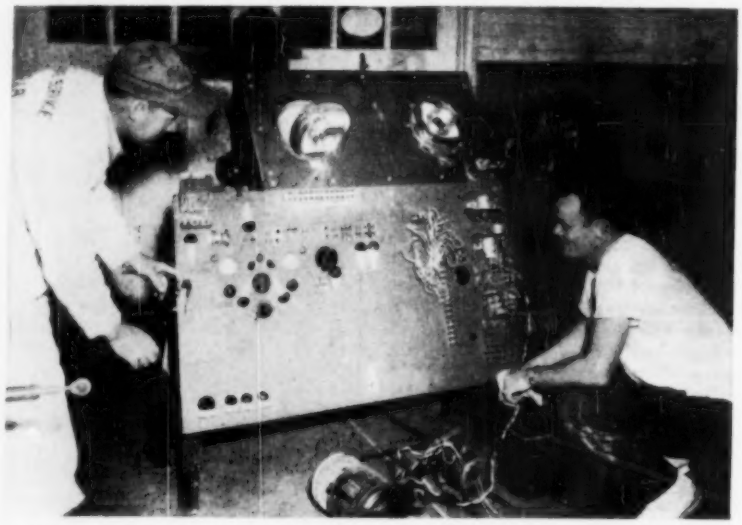

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August 17, 1951

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